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PC WORLD

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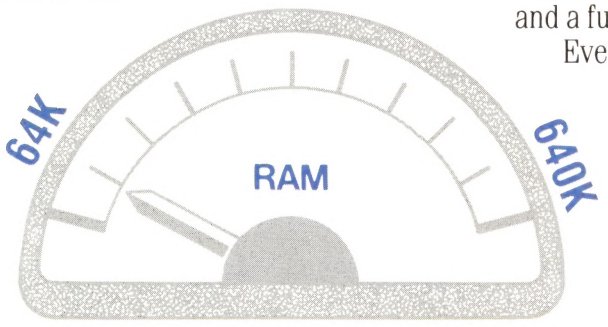

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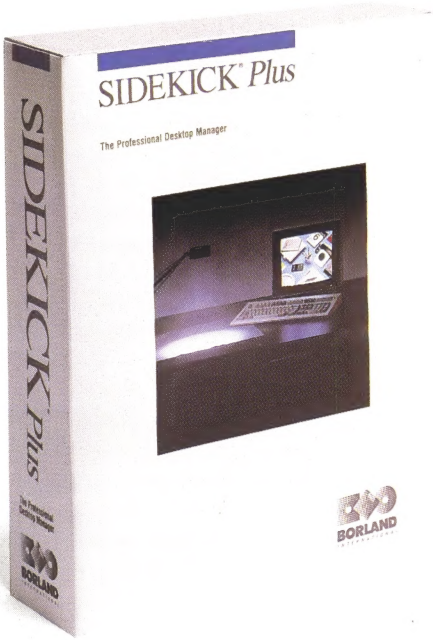

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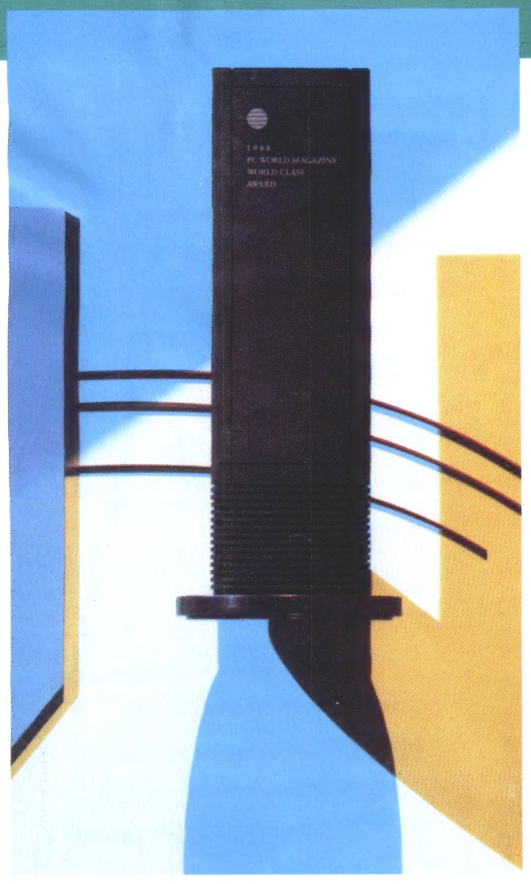

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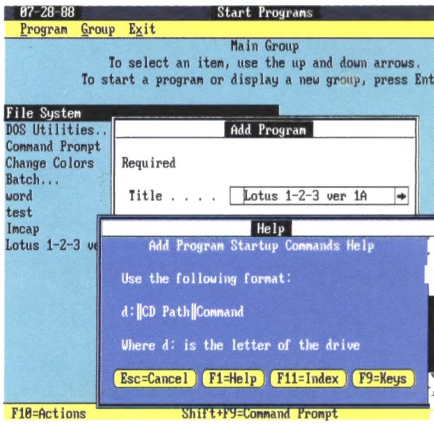

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Everybody Loves a Winner

JOHN HARDING

Editorial Manager Gina Vanlue and Assistant Editor Wes Nihei

When *PC World* sponsored the first World Class PC Contest in 1983, readers voted for their favorite hardware and software products in a mere 14 categories. This year, contest entrants put their preferences on the line in a total of 35 divisions. Over the years, some products have remained favorites: Updated versions of *1-2-3*, *dBASE*, and *Flight Simulator* are still at the head of their respective classes on the software side, while Epson and Hayes continue to dominate the dot matrix printer and modem categories, respectively, in the hardware division.

Laser printers, laptops, desktop publishing software, and local area networks are just a few of the categories that have come into their own in the intervening five years. Through it all, *PC World* readers have developed strong opinions and fierce loyalties. Assistant Editor Wes Nihei coordinated this year's World Class Awards. One consistent and reassuring message emerges from the balloting, Wes reports: "Computer users expect—and reward—well-engineered hardware and understandable, functional software."

Of course, for one lucky reader there's another dimension to the World Class Awards. Editorial Manager Gina Vanlue had the pleasure of selecting our Grand Prize winner. How does it feel to give away more than $30,000 worth of hardware and software? "Great," Gina says, "although it took a few minutes to convince our Grand Prize winner that it really was his lucky day!"

While we're on the subject of winning PC products, *PC World*'s Best Buy recommendations deserve mention. In the past six months more than 30 products, from companies large and small, have qualified as Best Buys. What does it take to earn the seal of approval from *PC World*'s editors? Raw speed or a long list of features alone is not enough. It takes an extraordinary balance of features, performance, ease of use, and price—in short, *value*—to earn the Best Buy label. And when companies display this sort of respect for users, everybody wins.

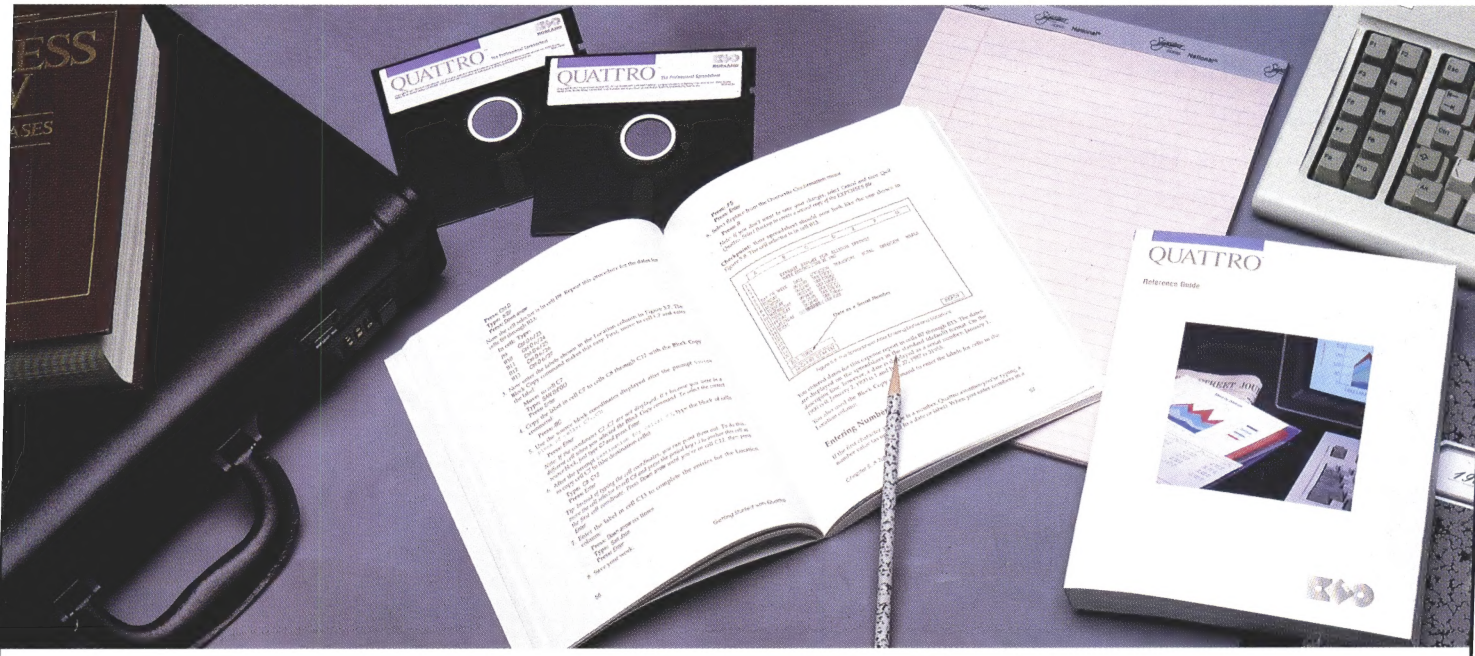
Also in this issue: Senior Editor Eric Knorr and NSTL team up to answer the question: "Is Your PC Ready for OS/2?" Contributing Editor TJ Byers ("Fax Times Seven") reviews the latest generation of boards that promise to put the office fax machine in your PC. Four intriguing new systems battle it out in "Compaq and IBM: Faster, Top to Bottom." DOS 4.00 is a shell of its former self, and that's good news, as Senior Editor Robert Luhn and Assistant Editor Scott Spanbauer ("DOS Lives!") discover. Finally, our buyers' guide to on-line services proves that information—of any kind—is only a phone call away.

Ed Bott

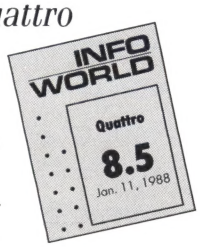
Ed Bott
Managing Editor

"Those who are considering purchasing 1-2-3 will be better off with Quattro"

—John Walkenbach, InfoWorld



Here's what InfoWorld had to say about Quattro



"There are some clear advantages in choosing Quattro over the 1-2-3 of today: easier installation, no copy protection, improved speed, much better macros, excellent graphics, a customizable command interface, and direct compatibility with industry standard file formats. If cost is a factor, you can get five copies of Quattro for the same money that would buy two 1-2-3 packages."

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Features: Improving the industry standard

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"Perhaps Quattro's main advantage over most other spreadsheets is its minimal recalculation capability. When you make a change in your spreadsheet, only affected cells are recalculated, greatly speeding things up in most cases."

"Other Quattro features that improve upon the 1-2-3 standard include auto-record macros, vastly superior graphics, and easy installation."

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Performance: Markedly superior to 1-2-3

"Our benchmark tests show Quattro markedly superior to 1-2-3 in file saves and retrieves."

"Quattro's graphics are a sight to behold."

"Quattro makes working with macros practically painless. If you're into complex 1-2-3 macros, the debugging feature alone is good reason to make the switch to Quattro."

"No one can argue that Quattro is anything less than an excellent spreadsheet value."

Excerpts from John Walkenbach's review of Quattro™ in InfoWorld, January 11, 1988.

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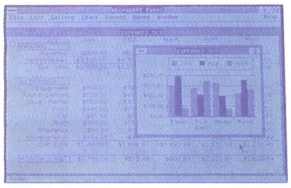

The C1 gives you access to thousands of programs for music and business—with a high-resolution 640×400 screen.

The C1 has a separate internal timer devoted to music applications. Keys conveniently marked with music symbols. And two programmable sliders, for greater MIDI control.

Of course, the C1 talks business as well as it does music. It's IBM-compatible, with a 286 processor and a full megabyte of memory (with room for 1.5MB more). Giving you access to thousands of the most advanced MS-DOS programs.

Choose from two models: one with a pair of 3.5″ disk drives, another with a single drive and built-in 20MB hard disk.

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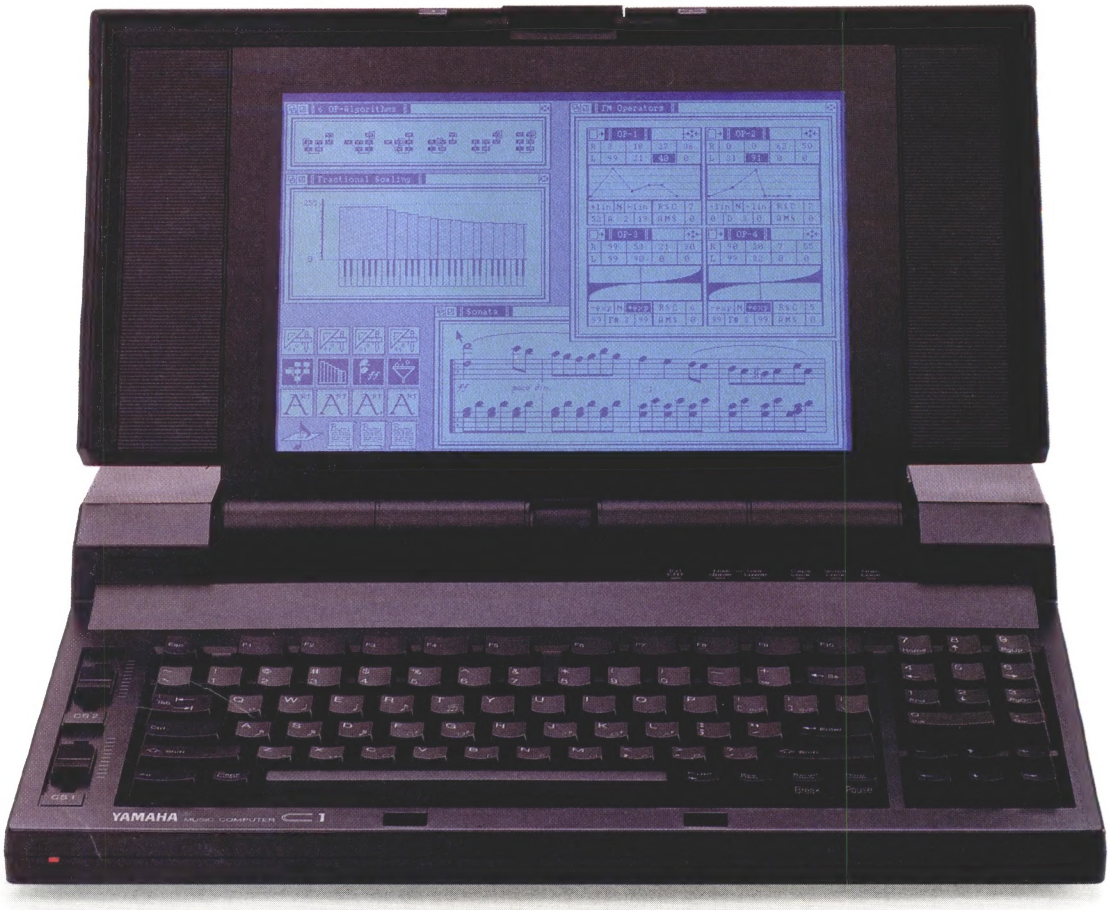

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Circle 273 on reader service card

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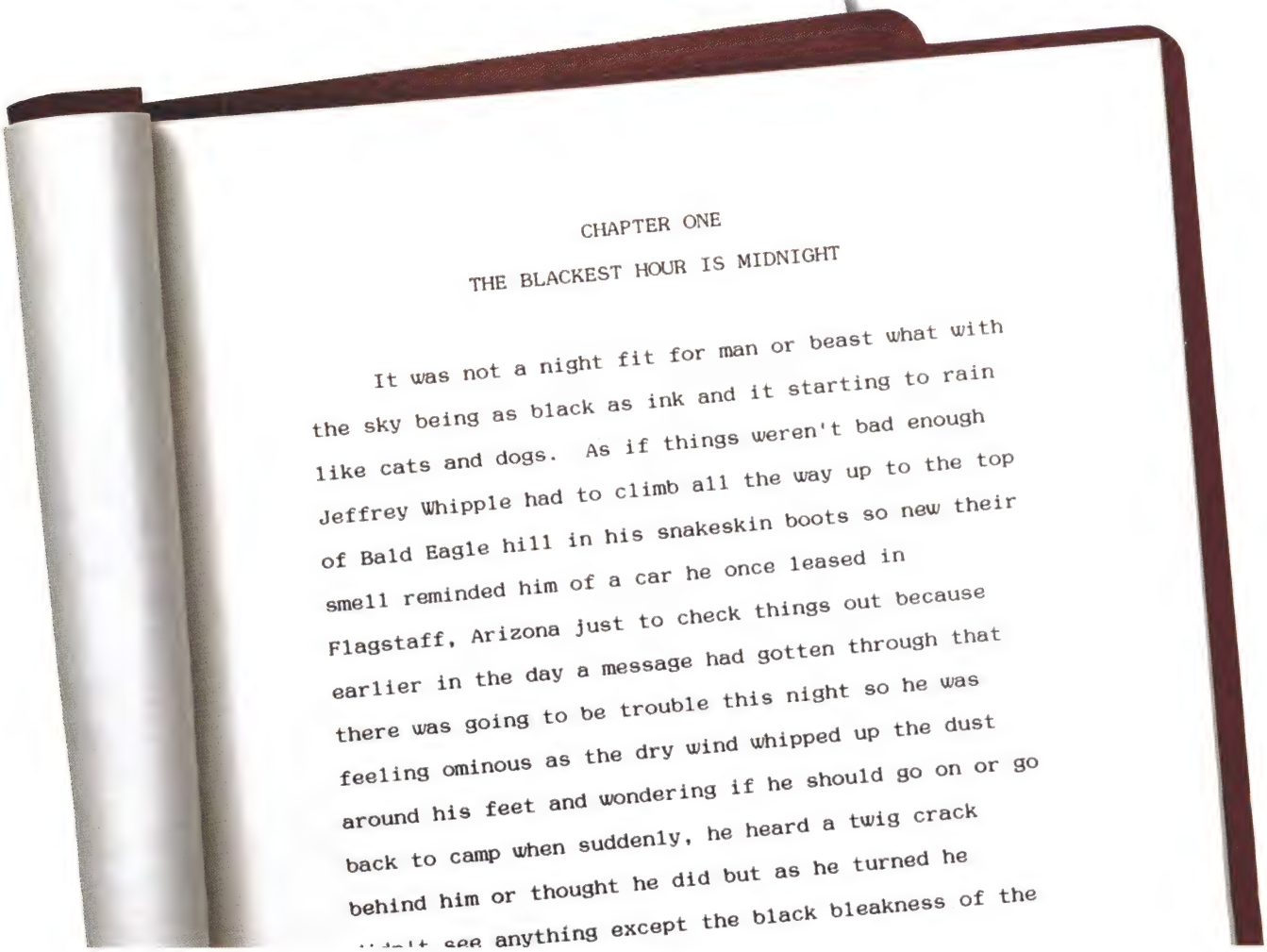

CHAPTER ONE

THE BLACKEST HOUR IS MIDNIGHT

It was not a night fit for man or beast what with the sky being as black as ink and it starting to rain like cats and dogs. As if things weren't bad enough Jeffrey Whipple had to climb all the way up to the top of Bald Eagle hill in his snakeskin boots so new their smell reminded him of a car he once leased in Flagstaff, Arizona just to check things out because earlier in the day a message had gotten through that there was going to be trouble this night so he was feeling ominous as the dry wind whipped up the dust around his feet and wondering if he should go on or go back to camp when suddenly, he heard a twig crack behind him or thought he did but as he turned he didn't see anything except the black bleakness of the

We're sorry that our new 24-wire Pinwriter® P5200 and P5300 printers can't do much for the quality of your writing. But they can certainly do wonders for the way it looks. The secret is the ribbon. Other dot matrix printers only use a fabric ribbon. Our Pinwriters print with both a fabric and a letter-quality, multi-strike film ribbon—the same kind used on executive typewriters.

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C&C Computers and Communications

Circle 253 on reader service card

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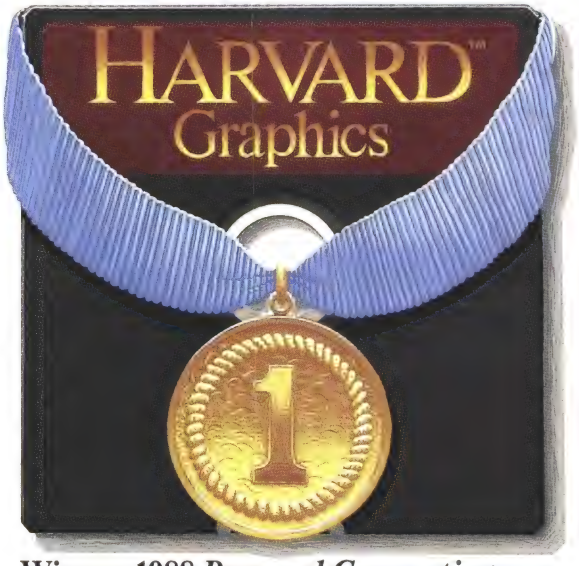
"They (Harvard Graphics)...made the best even better."

–Jim Seymour, "Best of '87" PC Magazine

"Product of the Year"–Infoworld 1988



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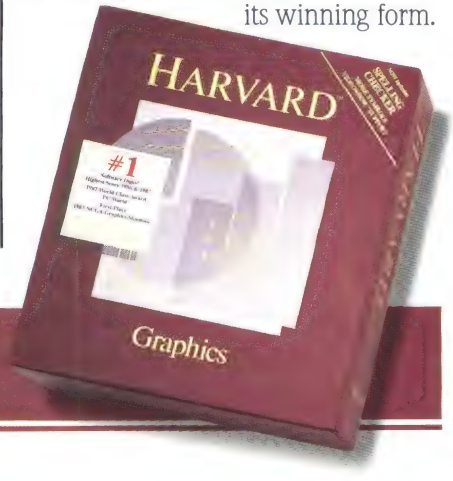

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Everex has been an industry leader since 1984, providing a variety of tape backup systems to meet your data security needs. Our external tape units are perfectly suited for sharing among several users because they can be easily transported from desk to desk. The popular half-height, internal units are designed to fit inside 5 1/4-inch disk drive slots. There's even a mini-cartridge drive that fits right into a disk drive slot and runs off an existing floppy controller.

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Circle 244 on reader service card

On July 18th, 1988, ORACLE made history by setting performance records in every major computing environment. Using the industry standard TP1 benchmark, ORACLE set speed records on IBM mainframes running MVS, DEC VAX minicomputers running VMS, and minicomputers running UNIX.

ORACLE set the world record for performance by running 265 TP1 transactions per second (tps) on a 3090 model 600E class mainframe running the IBM MVS operating system. This breaks the old record of 240 TP1 tps set by a cluster of 16 Tandem computers.

ORACLE also set the record for DEC minicomputers by running 49 TP1 tps on a VAX 6240 running VMS. This breaks the previous VAX/VMS record of 29 TP1 tps set on a VAX 8700 connected to a VAX 8800. Not only is ORACLE's performance nearly twice as fast as this previous record, but ORACLE's cost per transaction is almost four times better than that of the other system. And ORACLE's results were audited and verified by the Codd and Date Consulting Group.

ORACLE set a UNIX record of 110 TP1 tps on a large minicomputer from Sequent as well. These results were achieved processing a 1.1 gigabyte database containing 11 million rows of data. Once again, the results were independently verified by the Codd and Date Consulting Group.

ORACLE has long been recognized as the technology leader in DBMS portability. (ORACLE is still the only DBMS in the world that runs on MVS, VMS and UNIX.) Now ORACLE is the clear technology leader in performance as well. Your DBMS decision just got a little easier. Call us at 800-345-DBMS and run the portable performer.

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PS/2s Being Discounted

IBM's Gamble on Micro Channel Architecture Brings Low Return

Once sold at a premium, IBM microcomputers are being steeply discounted, reports market researcher StoreBoard, Incorporated. IBM blames the price cutting on its sales bonus program for PS/2 dealers, which it has now discontinued. But StoreBoard marketing manager Bob Grenier blames IBM's abandonment of industry standard bus architecture (ISA) in favor of Micro Channel Architecture. "Prices of PS/2s had to be lowered, and dealers were pushed to carry a lot of inventory, which in essence made them push PS/2s out the door at a lower price," he explains. Until six months ago, IBM models had sold at top dollar, with Big Blue's share of market revenue far outstripping its unit share. This year, however, as the PS/2's novelty has worn off and ISA models have continued to dominate sales, IBM's revenue and unit shares have converged. Both accounted for 32 percent of all dealer sales at the end of the second quarter, compared with 46 percent for revenue and 43 percent for units during the same quarter a year earlier, reports Grenier. Meanwhile, Compaq Computer has been charging a premium for its ISA systems and is still gaining market share; Compaq sold only 17 percent of all units but garnered 25 percent of market revenue during the second quarter. "Market data indicates that acceptance of IBM PS/2 products remains stalled," crows Compaq vice president Mike Swavely. Of course, the dealer channel accounts for only 35 percent of sales, and IBM does better distributing directly to large accounts. However, *PC World* interviews with some large corporate buyers substantiate Grenier's and Swavely's contention.

Scanning a Page at a Time

Caere calls OmniPage a Scanner Software Breakthrough

Caere Corporation is shipping what it describes as the first page-recognition software for the personal computer. Unlike current optical character recognition (OCR) packages, Caere's *OmniPage* "recognizes" a whole page at once, regardless of the mix of graphics and typefaces involved, claims Director of Office Products Larry Miller. Compatible with both IBM PC and Macintosh scanners, *OmniPage* employs artificial intelligence to recognize 8½-by-11-inch or 11-by-17-inch pages; columns; indentations; and a wide number of fonts, as well as to teach itself new fonts as it encounters them. The $1995 IBM-compatible version of *OmniPage* ships with a run-time version of *Microsoft Windows 2.0* and a Motorola 68020-based coprocessor board with 2MB of memory. The board handles most of the computation-intensive scanning processing at 40 to 115 cps, freeing up the computer's main processor. Compatible with the new Apple Scanner, Hewlett-Packard's ScanJet, and Canon's IX-12, *OmniPage* also reads bit-mapped and TIFF files created by other scanners and can convert ASCII text into the formats of most popular word processors and desktop publishers. This is the first retail product for Caere, a supplier of OCR and bar-code scanners that was established by Intel founder Robert Noyce 15 years ago. *OmniPage* is being comarketed by both Hewlett-Packard and Apple.

Xerox Builds a Family

Xerox's Ventura Publisher Gets Network Version and New "Professional" Features

Xerox has expanded *Ventura Publisher* into what it calls a family of products and has added more than 70 new features. In addition to *Xerox Ventura Publisher 2.0*, it has introduced *Xerox Ventura Publisher: Network Server* and *Xerox Ventura Publisher: Professional Extension*. The former brings the software to work groups using the most popular LANs, while the latter has new "professional" features such as expanded memory support, automatic vertical justification, and WYSIWYG equation generation. (For product highlights, see the preview in this issue.) Xerox claims that these additions to its line enable the company to compete in the professional publishing and technical engineering arenas heretofore dominated by Interleaf's family of high-priced publishing products. However, *Ventura Publisher 2.0* lacks the dedicated word processing, graphics, and other integrated capabilities of the $2500 *IBM Interleaf Publisher*. Xerox marketing manager Randi Doeker characterizes the Interleaf product as "a dramatic change, a way of life," adding that her company prefers to let users choose their own complementary applications and keep its $895 core package. *Professional Extension* will retail for $595, while *Network Server* includes one file server version of 2.0 for $1295. Xerox expects to sell two-thirds of the 150,000 full-feature desktop publishing units estimated to ship for the PC this year.

TOPS Takes Off

Sun's Networking Acquisition Zooms to 500,000 Network Nodes This Year

TOPS Corporation is experiencing an explosive growth in demand for its *TOPS* distributed networks. The company, which has grown from 30 employees to 230 and shipped 500,000 network nodes since Sun Microsystems purchased it 15 months ago, shipped 70,000 copies in June alone. The subsidiary's financials are mixed with Sun's, but TOPS general manager Rich Shapero reveals that TOPS gained almost 50 percent of its revenues in its last quarter, half of that during the last month of the fiscal year ended June 30, 1988. *TOPS'* soaring sales have boosted it to the number three slot behind *1-2-3* and *WordPerfect* on the Micro D bestseller list. Founded by entrepreneur Nat Goldhaver two years ago, TOPS had shipped about 20,000 units in the six months before being acquired by Sun. "By an infusion of capital, more formal planning, and building a management team, Sun has taken it to the next plateau," explains Shapero. *TOPS* differs from server-based competitors like 3Com's *3+* and Novell's *Netware* in that it distributes files across all nodes. *TOPS* is better for mixing Macintoshes and PC compatibles on a single network thanks to its file interchange software, and a *TOPS* node can function as a gateway into server-based LANs. *TOPS* lists for less than $300 per Mac node and for around $425 per PC node, with street prices at half of list.

AST Attacks

Nouveau System Maker Targets IBM's and Compaq's 286 Market Share

Having turned potential disaster into a computer-making success story, former board maker AST Research is now after IBM's and Compaq Computer's market share. AST capped off its first full year of making computers with a groundbreaking for a new $30 million headquarters in Irvine, California, and a $2.2 million television advertising campaign that aired during the recent summer Olympics. Broad-based consumer advertising is rare for PC industry companies, and AST's 15- and 30-second Olympic spots indicate that the company "has arrived," says Senior Vice President James Ashbrook. This advertising pull is being complemented by lower prices on most models and deeper discounts for AST dealers. The system maker, which recently signed volume purchase agreements with the MicroAge and ComputerLand chains, believes that IBM and Compaq are focused on 80386-based computers, providing the opportunity for AST's Premium/286s to squeeze onto more first-tier dealers' shelves. "We're focusing our sales force and marketing programs on the 286," says Ashbrook, who claims that the Premium/286 is already the third most popular brand behind comparable IBM and Compaq models. AST has shipped more than 130,000 of the machines. Diversification into systems had depressed AST's balance sheet and stock price at the end of 1987. But the company closed fiscal year 1988 on June 30 with a 100 percent increase in revenues to $412.7 million, and $15.1 million in profits, more than half of which came in the fourth quarter.

Tandy Consolidates DeskMate

New Single-User and LAN Versions Enhanced

Tandy Corporation has consolidated the various versions of its *DeskMate* environment/desktop utility into a single upgraded package with a network extension. "It was getting too confusing," says Vice President of Software Design Scott Cutler, referring to all iterations of *Personal DeskMate, DeskMate II,* and *Professional DeskMate* that have evolved since 1984. *DeskMate 3.0* will work on all Tandy machines and be resident in ROM on the new Tandy 1000 TL and 1000 SL. In addition to its bit-mapped graphic user interface, *DeskMate 3.0* includes a text editor with a 90,000-word spelling checker, a spreadsheet, a communications module, a drawing program, a card file, an auto-dialer, a calendar, and a to-do list. On a LAN, *DeskMate Workgroup Companion* adds a shared address book, the ability to redirect output to different printers, remote access to the computer by modem, and a central phone-messaging capability. Also added is an "action item" capability that lets multiple work-group members comment on a topic in a single file. More than a dozen third-party vendors have announced applications for the *DeskMate* environment. In addition, 3Com has announced plans to bundle selected portions of *DeskMate Workgroup Companion* with some of its networking products. *DeskMate 3.0* retails for $99.95, while *DeskMate Workgroup Companion* is $149.95.

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Introducing Wells American's CompuStar® Multi-Bus Business Computers. The world's first and only multi-processor, convertible bus™ microcomputers.

Ask any computer expert about what ype of system you should buy nowadays and you'll likely get a "pass the bus" response. omething like — "Well, uh, the PC/AT* bus s your best buy but, then again, the new PS/2* bus may become the next industry standard." Great advice, right? If trying to ecide on a processor weren't tough enough, now you're expected to pick a bus, too.

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The all new *CompuStar*® from Wells American not only lets you interchange microprocessors, you can also mix and match buses — a PC/AT bus, a PS/2 bus or. . .both. As your computing needs change, simply snap in a new processor or add an extra bus. You'll never again have to worry about buying the *wrong* computer system!

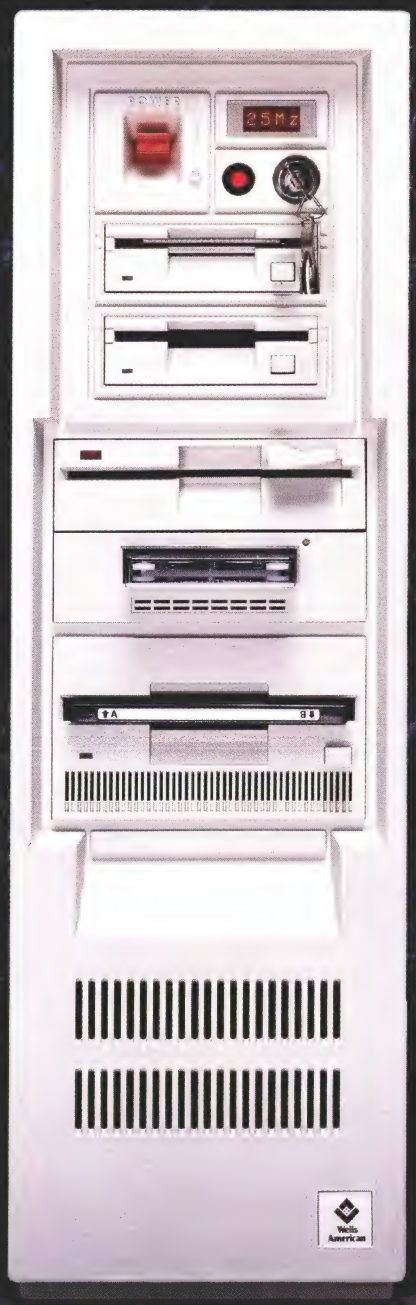
FOUR COMPLETE SYSTEMS IN ONE

The CompuStar can be configured with any of four microprocessors — an 8086, an 80286, an 80386SX, or an 80386. The processor and up to *16* megabytes of user memory have all been combined, using the latest VLSI technology, on a single, plug-in CPU module. Plus, any time during the first year of ownership, CompuStar users can "trade-in" the CPU module they initially selected toward the purchase of any of the other more powerful modules. *Nobody* but Wells American gives you this kind of value.

CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use *both* buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add an AT bus, just snap in an AT Bus Module. Depending on configuration, the CompuStar can have up to *13* bus expansion slots — all AT slots, all PS/2 slots or a "*split-bus*" of AT *and* PS/2 slots. Best of all, you can reconfigure your CompuStar whenever you want.

$1995



The CompuStar is also easily expanded. That's because there are *seven* CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that actually leaves *more* room on your desktop than any of the so-called "desktop" models.

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FINALLY, AFFORDABLE TECHNOLOGY

Think all this technology sounds expensive? It's not. CompuStar 20MHz 80286 systems start as low as $1995†. There are also inexpensive 8086 and powerhouse 25MHz 80386 systems available. Plus, there is a wide variety of CompuStar display, tape and disk options including a one gigabyte erasable optical disk. You can choose a factory preconfigured CompuStar or custom design one yourself. Just unlock the front panel and literally "snap-in" a bus, CPU or disk module in a matter of seconds. It's system flexibility never before available. . .at *any* price.

While one of our competitors (we won't mention any names) threatens you with "missing the bus," most simply *pass* the bus. Our new CompuStar however, *eliminates* the bus problem altogether. Not to mention the processor problem. Even the expansion problem. Prove it to yourself. Call today about our CompuStar 31-day trial offer. Oh and by the way, the next time anyone asks, tell 'em you know where the bus stops.

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Circle 21 on reader service card

386SX Models Pick Up

Intel Predicts 30 to 50 Introductions Before Year-End

It could be an 80386SX Christmas. Based on PC manufacturer commitments, Intel Corporation 80386SX product manager Marc Rayacich expects between 30 and 50 manufacturers to introduce 386SX models before year-end, including "about 10 household names. In fact," says Rayacich, "I can't think of any of our PC customers who aren't looking very hard at the 386SX." Compaq was the first out, introducing its 386S shortly after the SX chip's mid-June announcement. In recent months, NCR Corporation has announced a 386SX add-in board for upgrading its current systems, and NEC Information Systems has introduced both a PowerMate SX for the desktop and the PowerMate Portable SX. The chip can run the same 32-bit software at the same speed as the standard 16-MHz 386 but has somewhat slower 16-bit external data pathways. It costs less and can be integrated into current 286 designs relatively easily, says Rayacich. Intel can now supply all the chips that manufacturers need and expects "a few hundred thousand units" to ship before year end. The challenge for next year, adds Rayacich, will be to bring 386SX system prices down to the neighborhood of similar 286-based configurations and to keep up with expected demand: "I will be extremely disappointed if we get less than 2 million orders and shocked if we get more than 4 million."

Borland Gets the Bugs Out

Turbo Pascal, Turbo C, and Assembler Finally Get a Debugger

Borland International has begun shipping the long-awaited debugger for its Turbo Pascal and Turbo C languages, which have sold more than 1.2 million copies since Borland first shipped Turbo Pascal in 1983. Versions 2.0 of Turbo C and 5.0 of Turbo Pascal have integral debuggers for compiling, editing, and linking smaller programs. But Borland has also introduced a more versatile debugger with an assembler—called *Turbo Assembler & Debugger*—that product manager David Intersimone claims is easier to use and more powerful than the *CodeView* debugger for Microsoft languages, Borland's principal competition.
In addition to providing the ability to set global breakpoints, *Turbo Assembler & Debugger* lets the programmer use conditional statements to set an unlimited number of local breakpoints and features a key-event logger to record all or portions of debugging sessions on disk for easy return. The debugger uses nested pulldown menus with point-and-shoot command selection, plus overlapping windows for up to 12 views of key program elements such as source module, variables, breakpoints, and active functions. It also provides various ways to reserve conventional memory for the debugged program. It supports LIM EMS 3.2 and can run in extended memory on an 80386 machine or even on a remote machine connected via serial cable. The program usually requires 200K of conventional memory, although the symbol table and other files can reside in high memory.

Wells Clones the PS/2

Company to Offer Both AT-Style and MCA-Compatible Buses in One Box

Mail-order computer supplier Wells American has introduced what it bills as "the world's first and only...convertible bus microcomputers," featuring both MCA-compatible and standard AT-style buses. The floor-standing CompuStar can be fitted with up to 13 AT-style expansion slots, 10 MCA-compatible expansion slots, or a combination of 7 AT-style and 5 MCA-style slots. In addition, the easily reconfigurable line features a passive backplane architecture that accommodates CPU cards with either Intel 8086, 80386, or 80386SX processors or an 80286 CPU from Harris Corporation. "The two dilemmas—which processor and which bus to use—are the key to most people's buying decision," says Product Manager Mike Hoyle. "The CompuStar gives users freedom from the dilemma." But Wells legal counsel Kenneth King demurs when asked if the company has a license from IBM to clone MCA, responding that "CompuStar in its present state infringes no known patents." However, MCA-compatible chipset makers maintain that 100 percent compatibility with MCA can be achieved only by copying portions of the architecture and that IBM's permission is needed to do so. Wells is now shipping a CompuStar with the 80286 6/20-MHz Harris chip and an AT-style bus. An 8086 CPU card will be available in October, and 80386 versions will be available in November in 8/16-MHz, 10/20-MHz, and 12.5/25-MHz configurations. ●

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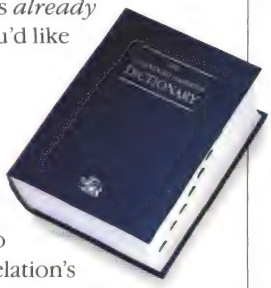

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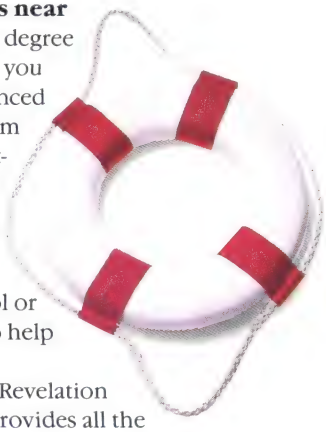

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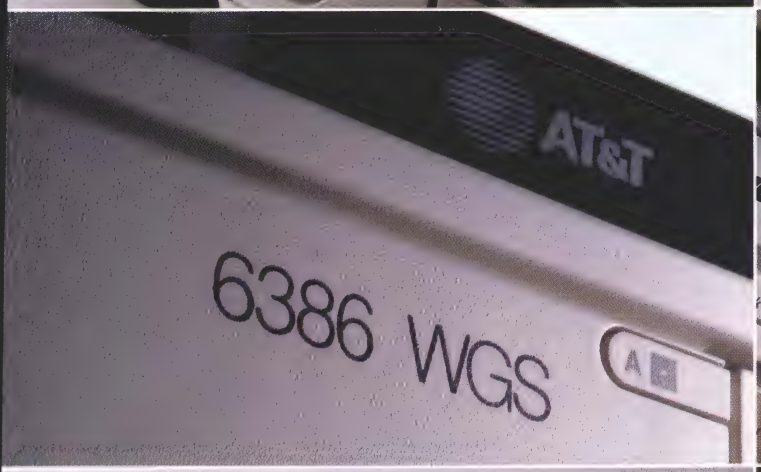
Circle 167 on reader service card

INTENSE COMPETITION HAS A WAY OF BRINGING OUT THE BEST.



In the computer industry, manufacturers fight to make their machines faster, friendlier, and more powerful than everybody else's. But as you may have noticed, the most successful competitors build their systems around the same chip: Intel's 386™ microprocessor.

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Circle 272 on reader service card

The Cure for MacEnvy.

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More Power to You

Twists in technology don't have to be painful. DOS 4.00 means simpler, more powerful DOS applications and a smoother transition to OS/2.

Richard Landry

FRED STIMSON

There's an old saying, You can tell the pioneers by the arrows in their backs. Most PC users have felt the sting of those arrows at one time or another. But the darts have never flown so thick and fast as during the last year, when IBM set out to convince unwary users not only that the AT bus was dead but that OS/2 was about to make their massive investments in DOS applications obsolete too.

Since then the news on the hardware front hasn't gotten any better. One look at our breakthrough OS/2 multitasking report from NSTL (see "Is Your PC Ready for OS/2?" in this issue) should convince any would-be pioneer that the next generation's OS/2 applications will require a different kind of system than those now on most users' desktops. PCs armed with 386 chips, plenty of 32-bit RAM, memory caching, and super-fast hard disks will be standard equipment to run tomorrow's software. But how many people have such a system today? And what guarantee do buyers have that today's "next-generation" systems will be up to tomorrow's tasks?

IBM must have gotten a clear message from the large number of users who are balking at PS/2 purchases, because the newly released DOS 4.00 is a marvel of conservatism (see "DOS Lives!" in this issue). Besides finally cracking the 32MB barrier for hard disk partitions (a feat even OS/2 doesn't manage), DOS 4.00 includes a number of features guaranteed to extend the life of the old operating system well into the next decade: a shell to make file and program management easier, a character-based interface that mimics the high-end Presentation Manager, and support for the EMS 4.0 expanded memory specification.

There's a certain irony to these improvements, because they confirm trends that IBM's been bucking all along. When Lotus, Intel, Microsoft, and AST announced EMS 4.0 last fall, for example, Big Blue was nowhere in sight (see my column for December 1987). Instead, perpetual upstart Quarterdeck Office Systems touted its support for the spec in *Desqview.* Microsoft followed suit with *Windows,* and later Borland jumped on the bandwagon with *SideKick Plus.*

Now it's clear that owners of today's PCs, ATs, and PS/2s can get more mileage from their hardware and software investments simply by adding an EMS 4.0–compatible board to their systems and matching it up with software that exploits the spec.

(continues)

With *Windows* or *Desqview*, multitasking old applications is a relative snap. With *SideKick Plus*, DOS becomes an environment with the kind of multitasking power you might reasonably expect from OS/2.

But support for a robust expanded memory spec is only part of the story. Ever since OS/2 was announced, IBM has been trying to put distance between its Presentation Manager interface and *Microsoft Windows*. DOS 4.00 does two things to demolish that strategy.

First, DOS 4.00 ensures that a host of interface improvements will bridge the DOS and OS/2 worlds. Like other large software firms, Lotus says it intends to move its character-based applications (such as *1-2-3*) to the DOS 4.00 interface. Products like Symantec's *GrandView* already incorporate the look of *Windows*, but in character mode. And Microsoft's not sitting still, either. Expect future *Windows* upgrades to sport a more functional version of the DOS 4.00–style shell, with the Presentation Manager's ability to group multiple applications together in "sets" that can be opened with a single keystroke. Expect *Windows* and the Presentation Manager to share a common, environment-wide macro language that will permit users to build powerful, customized systems from a menu. And finally, expect transparent data sharing between *Windows* and Presentation Manager applications.

Second, some of EMS 4.0's more esoteric features are designed to speed *Windows*' performance and extend its power to a level that rivals the Presentation Manager. For example, Microsoft is reportedly hard at work on ways to let *Windows* applications crack the 640K barrier. When that advancement finally makes the scene, the differences between *Windows* and OS/2 will be far less significant than the differences between character-based software and its graphics-based counterparts.

It doesn't take a crystal ball to see that in the next few years application software will split into three price/performance tiers: character-based DOS 4.00 software for owners of 8088 machines; *Windows* software for owners of 286 systems and for 386 owners who want a smooth transition from character mode to graphics mode; and 16-bit OS/2 software for users who can't solve their problems by any other means. All these directions will finally converge in a 386 version of OS/2 that will incorporate *Windows/386*'s ability to multitask DOS applications.

I recently met a prominent *Windows* developer who gave me this assessment of today's Presentation Manager: "It's just like *Windows* was two years ago—slow and buggy." Pioneers take note! Though you shouldn't expect the arrows to stop flying, it's heartening to know that even Big Blue pays attention when users say, Enough!

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107, or send an MCI message to Richard Landry/301-3685. ●

POWER TIP NO. 11

MultiMate Puts Fonts at Your Fingertips

With *MultiMate Advantage II*, you can display the fonts available for your laser printer—and bypass the print options screen—by pressing <Alt>-C? when creating or editing a document.

Irene Patti
Ashton-Tate,
East Hartford,
Connecticut

POWER TIP NO. 12

Fast Caps With Word

Microsoft Word doesn't have a command that capitalizes text. But there's a shortcut. Highlight the text and press <Alt>-K, the small-caps command. With some printers, you'll get ¾-size capital letters. But with some laser printer fonts, most dot matrix printers, and all daisy wheel printers, you'll get normal-size caps. This quick trick adds a feature that *Word* lacks, but shouldn't.

Robert Luhn
Senior Editor

LETTERS

Reactions and responses from the PC World community

Hot Button

I would like to present another angle to Michael Covington's "Shareware or Greedware?" [*Another Angle, PCW,* July 1988]. I agree with his assertion that we need more of a giving spirit in the PC world. Many programs currently marketed as shareware should instead have been donated to the public domain. I call these programs "what-the-heck–ware" because the author reasons: What the heck—if I put a shareware notice on it, someone might just pay for the program. This hurts the entire community by diluting the overall quality of the shareware market.

However, Mr. Covington does shareware a great disservice by ignoring the vast amount of good it has accomplished. Besides contributing to the elimination of copy protection and a general decrease in commercial software prices, shareware has allowed millions of people to purchase quality software at very low prices, with the added luxury of trying out the programs before buying them.

I challenge Mr. Covington to name one public-domain program of the same caliber as *ProComm, AutoMenu, PC-Write,* or *PC-File+*. None of these programs would have seen the light of day except as shareware, and the PC community would be worse off without them.

Jim Button
CEO
ButtonWare
Bellevue, Washington

ANTHONY RUSSO

It's a Job

I am outraged at Michael Covington's article in the July issue. He talks about giving free software to his students with no strings attached—who does he think he's kidding? Those students pay tuition to the University of Georgia to attend classes, and Mr. Covington is compensated for teaching the class, right? As a professional programmer I am compensated for writing software that, I hope, people will use to increase their productivity. Why shouldn't programmers use shareware as a marketing channel for innovative, low-priced software? Is it too much to ask $10 or $20 for a program that might save hours of manual work?

Jon L. Postyn
Forest Hills, New York

In Defense of Demoware

Michael Covington seems to have his wires crossed. The software he is complaining about is not shareware, nor is it in the public domain; rather it is a new animal called demoware. Having noticed

(continues)

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Thank You.

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that most people don't pay for the shareware programs that they use, some authors, like me, distribute demo versions of programs that are limited either in functionality or in the length or frequency of access allowed. Registered users receive fully operational versions of the software.

Of course, a few misguided souls forget to mention limitations in demoware documentation, and some shareware distributors aren't up-front with their customers about which of the programs they offer are demoware and which are fully operational. Then some folks get upset when they find out that the $50 package they paid $5 for is only worth $5—but that's a small price to pay to find out if a program is useful.

I take exception to Mr. Covington's remark that my software, which took me more than a year to write, is a petty attempt to make money without incurring expenses. Who does he think paid for my computer, my rent, my food?

Bill Fitzpatrick
Veneta, Oregon

Besides the letters above, I got dozens of CompuServe messages. Lots of people argued with things I didn't say. For example, I never said it was OK to violate copyrights, nor that programmers shouldn't get paid. But it amazed me how hostile people were to the idea of occasionally *giving software away.*

The Association of Shareware Professionals is currently working to correct some of the problems I pointed out, including the widespread misconception that shareware is free and the vagueness of shareware license statements. But what we really need are software publishers to which authors can submit programs in the same way writers submit books to book publishers. Authors would then collect royalties on copies sold without having to do the publishing themselves. —Michael Covington

News You Can't Use

Your *Product Outlook* item on the Canon Bubble-Jet BJ 130 printer ["High, Wide, and Handsome," *PCW*, March 1988], complete with photos, prices, and specs, sent me on a wild-goose chase after a product that didn't exist. The BJ 130 sounded great, so I rushed out to my authorized Canon dealer—who had never heard of it. She called Canon's Canadian office, where the printer was also unknown. Then I went to a different dealer who twice phoned Canon's United States office in search of the BJ 130; the calls went unanswered.

Certainly, informing *PC World* readers about what's new on the market means you can't always wait to see production models or shrink-wrapped packages before going to press. Still, you must protect your readers from vaporware and from wasting their time searching for products that do not yet or in some cases never will exist.

Don Greenwood
Scarborough, Ontario

As Product Outlook's *tagline points out, the column reports on "product announcements and upcoming releases." However, you can be assured that* Product Outlook *items are not just industry rumor; most prod-*

(continues)

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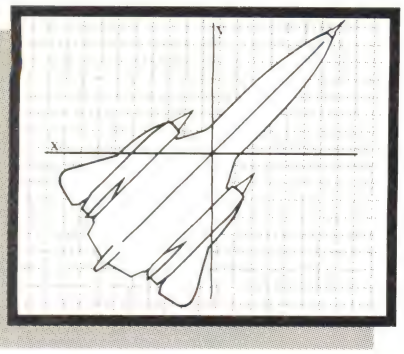

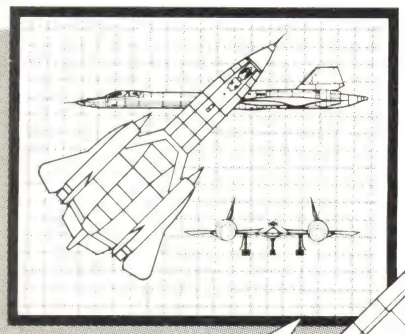

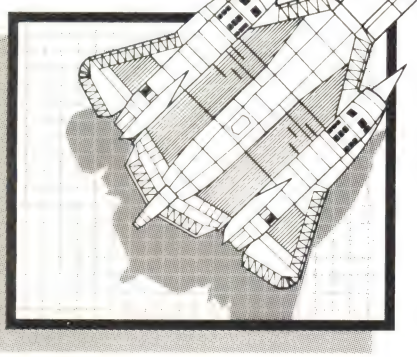

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Circle 257 on reader service card

ucts covered are on the market before the magazine is. In the case of the BJ 130, Canon announced the printer in the fall of 1987 and informed PC World *at press time that it would ship by March 1988. Canon subsequently delayed United States shipments until late April, but due to a change in the company's production facilities, significant quantities of the printer weren't available until June. Canadians are still waiting for the BJ 130: Canon's separate distribution organization there reported that the printer is not expected until September.* PC World *regrets any inconvenience this may have caused its readers. —Ed.*

Satisfied User Testifies

"Share the Wealth!" [*PCW*, June 1988] confirmed my overwhelmingly positive experience in using Cosmos's *Revelation*. Four years ago, fresh out of college, I was hired to schedule court appearances and allocate personnel in a busy law firm. After two months of trying to tame the enormous manual system, I looked for a data base to automate the task, and *Revelation* stood out. Using it, I developed a case management system that tracks the firm's every case, client, and court date. Unfortunately, the system was so successful that attorneys began to abandon their own systems and to depend entirely on me for case information.

The advent of *Advanced Revelation* solved that problem by letting the firm's secretaries, paralegals, and attorneys track every aspect of the litigation process themselves. Now I am free to explore the program's tremendous ability to project future caseloads, company costs, and cash flow.

C. Clark Landale
Cranford, New Jersey

Terminally Picky

The benchmarks included in "Share the Wealth!" failed to measure the most important aspect of multiuser data base performance: the change in response time when multiple users enter data from different terminals. Although the review did measure batch transactions running on multiple-terminal systems, batch processing programs are not commonly run concurrently in this type of application. A more realistic benchmark would time people entering data at workstations—the way these programs are actually used.

Also, the review made no mention of the abysmal performance of all three systems, which suffer degradation in speed as the number of workstations increases. Contrast that with a Pick multiuser operating system, which actually gets faster when running concurrent jobs due to its intelligent resource sharing.

Brian Gulino
Encinitas, California

It's the Frequency That Counts

Although *The Help Screen*'s answer to John Madell's question about foreign electrical power [*PCW*, July 1988] probably satisfied him, I want to clarify a couple of points.

First, when Mr. Madell used the term *transformer/converter*, what he probably meant to say was *voltage* transformer/*frequency* converter. Second, Technical Editor Karl Koessel erred when he described ±110- and ±220-volt peaks. Alternating current voltages are expressed as rms (root mean square) averages, and the peaks are therefore ±155.5 and ±311 volts, respectively.

David S. Mayo
Mountain View, California

You're correct about expressing AC voltages as rms averages. Although the numbers in **FIGURE 1** *of July's* Help Screen *are incorrect, this does not affect the explanation or the type of power converter required. Mentioning frequency conversion, however, reminds me that I failed to discuss problems users might encounter with monitors such as older CGA models that base their scan rates on the frequency of the AC power source. They will operate properly only when using the frequency for which they were designed. —Karl Koessel*

To send correspondence or submit material for publication in this column, please see How to Contact PC World, page 4.

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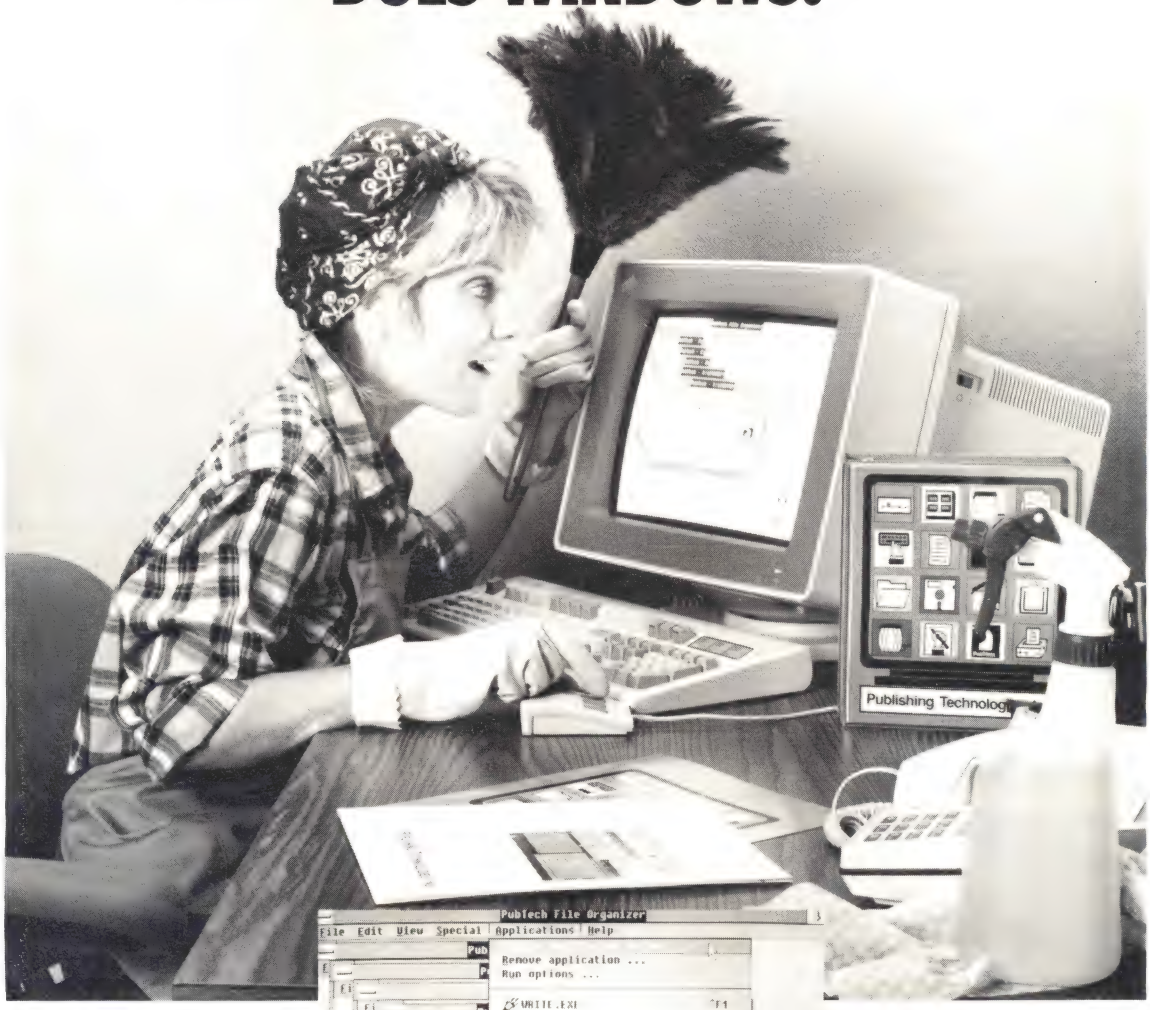

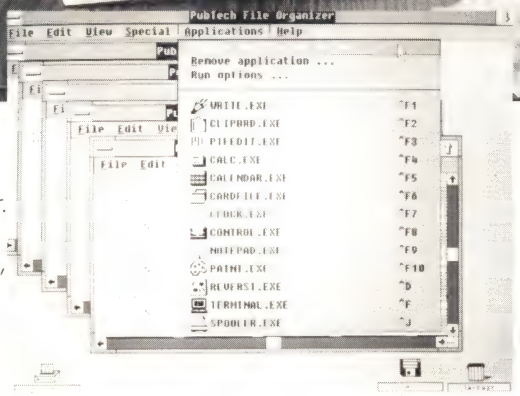

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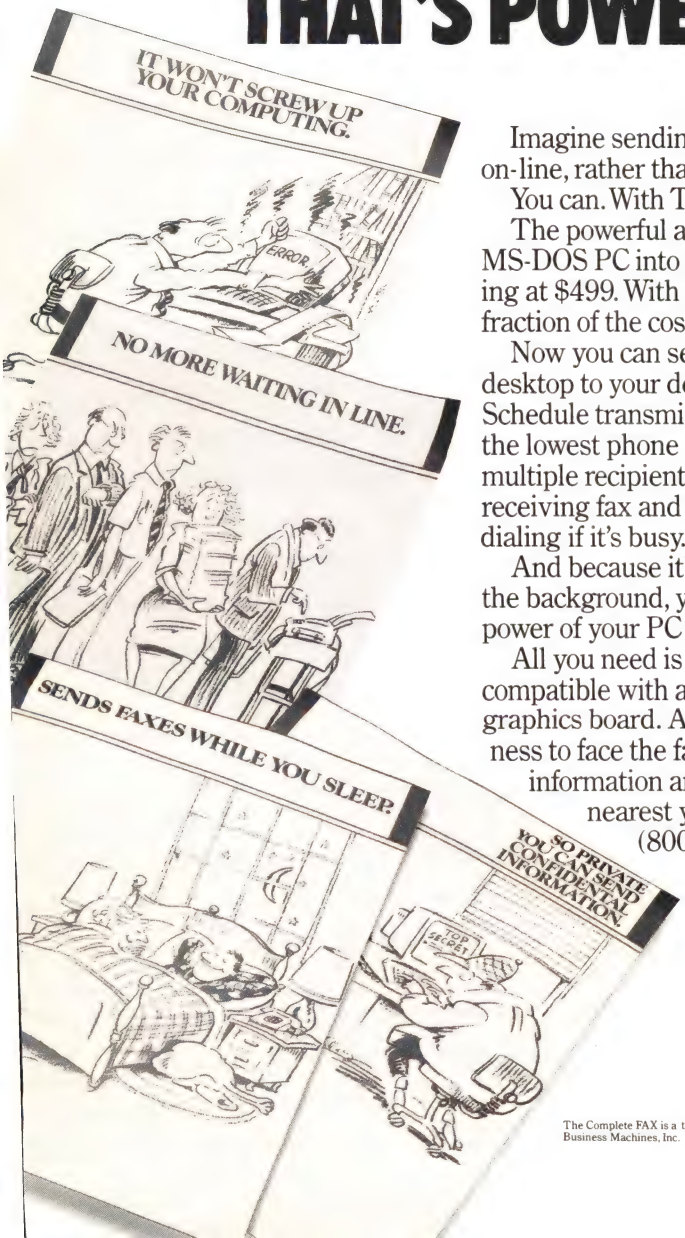

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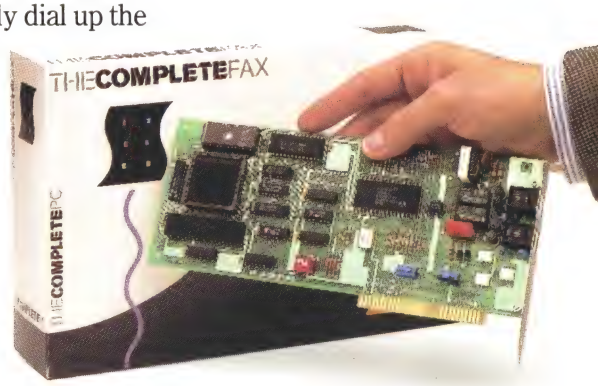

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Is There Life After Spreadsheets?

The search for intelligent software in the universe is picking up some exciting signals. Here are some breakthroughs you should know about.

David Bunnell

FRED STIMSON

Have you noticed that most of the spreadsheets, data bases, and word processing programs on the market today are called "feature rich"? The phrase reminds me of car sales lingo. Each year, new models roll off the assembly line differing little from the previous year's version except for some new options—a new dashboard doodad, a new seat heater. We're supposed to think we're getting something new and improved. In fact, each version of software, like each year's new car model, often doesn't provide a great deal of change from what came before.

But I'm looking for genuinely new kinds of software—new applications, new categories—and I'm beginning to see some promising developments of late. In particular, I'm excited about the wave of personal information managers (PIMs). They include Lotus Development's *Agenda*, Valor Software's *Info-XL*, Symantec's *GrandView*, and Persoft's *IZE*, among others.

PIMs are ingenious information organizers that provide you with a broad overview of the miscellaneous data you've fed into your computer, along with the ability to connect that data instantly (see this month's *Tech Notes*). PIMs are a great leap forward for data bases. You can structure and manipulate the information as you're entering it. With a traditional data base, you've got fixed fields and records. Even a powerful data base with numerous fields is somewhat rigid. A personal information manager allows you to move data and create as you go. I like that concept and the freedom it provides.

Another exciting development is a new program for academic computing called *Mathematica*, which promises to change the way engineering and mathematics are taught. Developed by Stephen Wolfram of Wolfram Research in Champaign, Illinois, *Mathematica* can do for algebra and calculus what the calculator did for arithmetic. You can write a command in English, and the program will translate it into the right algebraic or geometric formulas. It has the added ability to produce two- and three-dimensional graphs and simulations that illustrate equations and even concepts.

Though *Mathematica* is not yet available on the PC, IBM recently endorsed the program and announced that it would be available for the AIX/RT workstation.

A third tantalizing area of software development, existing between desktop publishing and

(continues)

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computer animation, is called desktop video. While applications for the *Macintosh* have taken the lead in this field, I don't think PC-compatible software will be far behind.

Desktop video allows owners of relatively inexpensive systems to create sophisticated graphics effects previously possible only on high-end workstations. This development has revived interest in the Commodore Amiga, which has the program chips and hookups for VCR systems. If you've heard of desktop presentations, you probably understand how charts and graphs can add punch to strategy meetings. Desktop video promises to expand this notion radically within a few years. Before long, you'll be able to present your marketing plan in video form, complete with sound effects.

I keep hearing people say we're in a slump in terms of creativity as well as sales. If we can step clear of the usual "options galore" sales talk and follow these and other exciting developments in software, we won't have to settle for a dull parade of "new" features. Software doesn't have to be boring to be good. ●

POWER TIP NO. 13

Repeat Word Text and More

In *Word 4.0*, pressing <F4> repeats all the text you've typed since you last moved the cursor. You can also use <F4> to repeat commands such as Copy, Delete, Insert, Replace, Search, and Undo.

Evelyn Morrison
New York City

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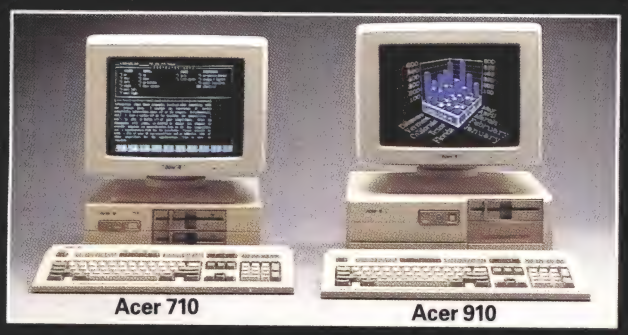

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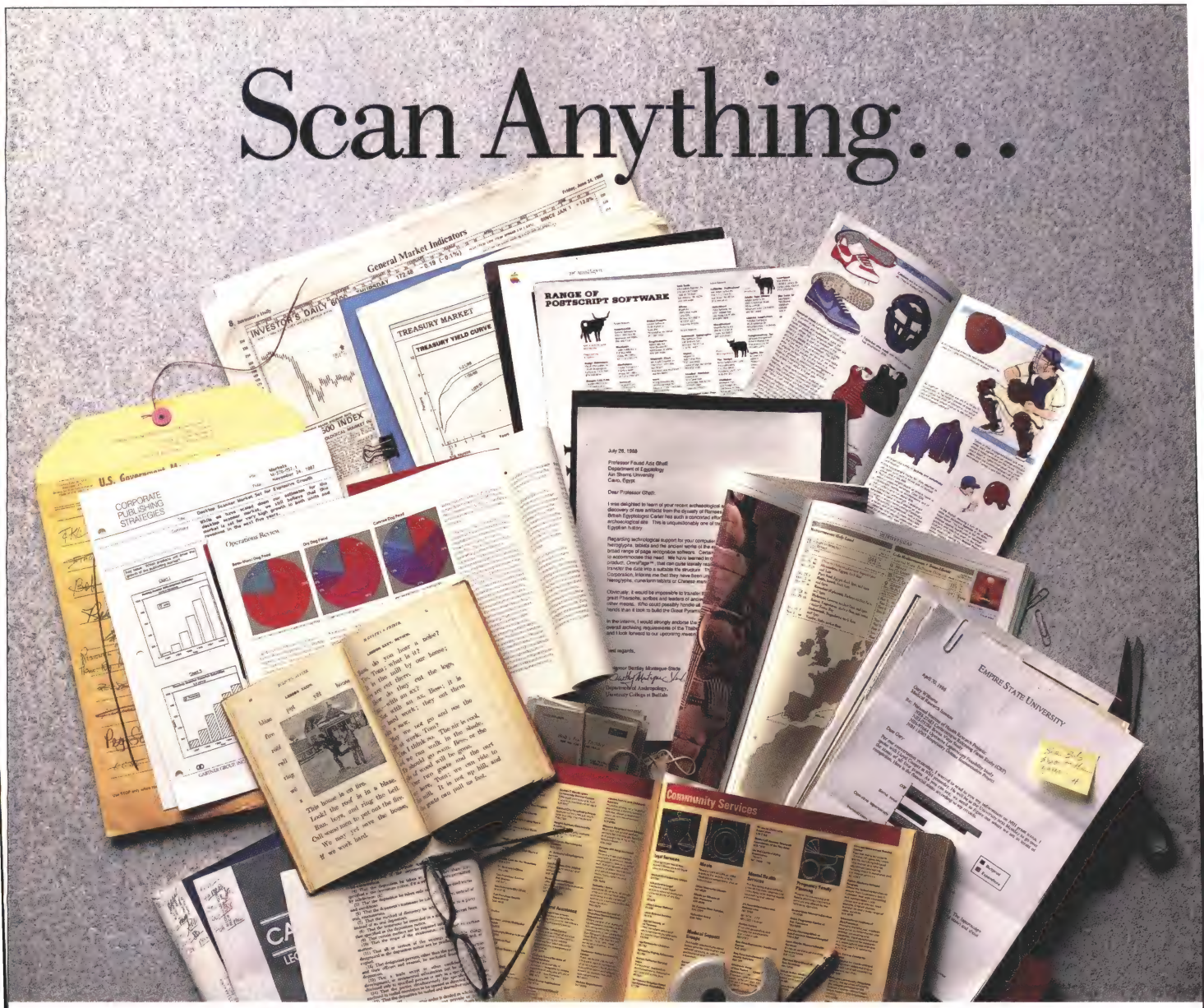

Let's Not Mince Words...
Let's face it, the art of *Page Recognition* has not advanced all that much since the days of the Egyptian Pharaohs. Text and graphics never seem to come out right. M's looking like inverted W's. Multi-column documents looking like Sanskrit. It's virtually impossible to mind your P's and Q's when the level of technology has not advanced beyond *electronic alphabet soup.*

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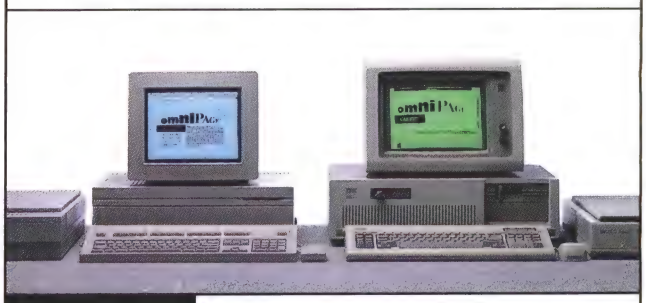

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*Note: Excessive Key Stroking (EKS) has been known to cause "spastic quivers" and ever so slight knee jerks in software engineers, data entry clerks and desktop publishing fanatics. Avoid whenever possible by using *OmniPage*.

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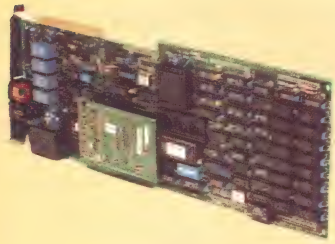

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Next in

PC WORLD

November

Supporting Your Business Strategy

LAN E-mail
Interoffice mail finally works—thanks to local area networks and electronic mail. And the latest generation of E-mail software is for everybody, not just power users. *PC World* looks at four LAN E-mail packages that go beyond what network vendors offer in ease of use and features—two even run under *Windows*.

Groupware
As PC users hook up to local area networks, mild interest in group productivity software is becoming keen demand. The wave began with network word processing software that offered multiuser features. Now, software packages that help users cooperate on dozens of tasks are poised to enter the market.

386 Environments
Who says you need OS/2 for multitasking? Four operating environments let you harness the power of your 386 to run multiple DOS programs at once. *PC World* evaluates *Windows/386, Desqview, VM/386,* and *PC-MOS/386*. The choice is yours.

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The future of personal computing is clear. More powerful PCs. Easier to use PCs. With graphics and character-based programs working side by side. Talking to each other. Multitasking. Windowing. Menuing. Mousing. Getting your work done easier and faster.

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Add DESQview to your PC and it quickly finds your programs and lists them on menus. So you can just point to the program, using keyboard or mouse, to start it up. DESQview knows where that program lives. And what command loads it.

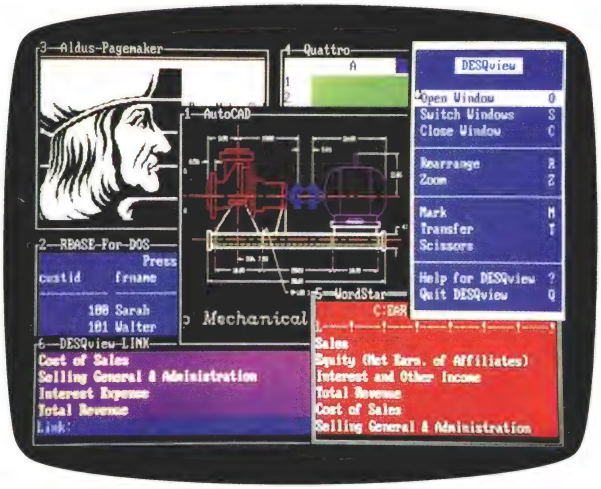
For those who have trouble remembering DOS commands, it adds menus to DOS. It even lets you sort your files and mark specific files to be copied, backed-up, or deleted— all without having to leave the program you're in.

Best of all, DESQview accomplishes all this with a substantial speed advantage over any alternative environment.

Multitask beyond 640K.

When you want to use several programs together, you don't have to leave your current program. Just open the next program. View your programs in windows or full screen. Open more programs than you have memory for. And multitask them. In 640K. Or if you own a special EMS 4.0 or EEMS memory board, or a 386 PC, DESQview lets you break through the DOS 640K barrier for multitasking. You can start 1-2-3 calculating and tell Paradox to print mailing labels while you're writing a report in Word Perfect, or laying out a newsletter in Ventura Publisher, or designing a building in AutoCAD.

For programmers, DESQview's API, with its strengths in inter-task communications and multitasking, brings a quick and easy way to adapt to the future. With the API's mailboxes and shared programs, programmers are able to design programs running on DOS with capabilities like those of OS/2.



DESQview even lets you transfer text, numbers, and fields of information between programs.

Fulfill the 386 promise.

For 80836 PC users, DESQview becomes a 386 control program when used in conjunction with Quarterdeck's Expanded Memory Manager (QEMM)-386—giving faster multitasking as well as virtual windowing support.

And when you use DESQview on an IBM PS/2™ Model 50 or 60 with QEMM-50/60 and the IBM Memory Expansion Option, DESQview gives you multitasking beyond 640K.

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If all of this sounds like promises you've been hearing for future systems, then you can understand why over a million users have chosen DESQview. And why *PC Magazine* gave DESQview its Editor's Choice Award for "The Best Alternative to OS/2," why readers of *InfoWorld* twice voted DESQview "Product of the Year" why, by popular vote at Comdex Fall for the last two years in a row, DESQview was selected as "Best PC Environment" in *PC Tech Journal's* Systems Builder Contest.

PC MAGAZINE EDITOR'S CHOICE NOV. 24, 1987

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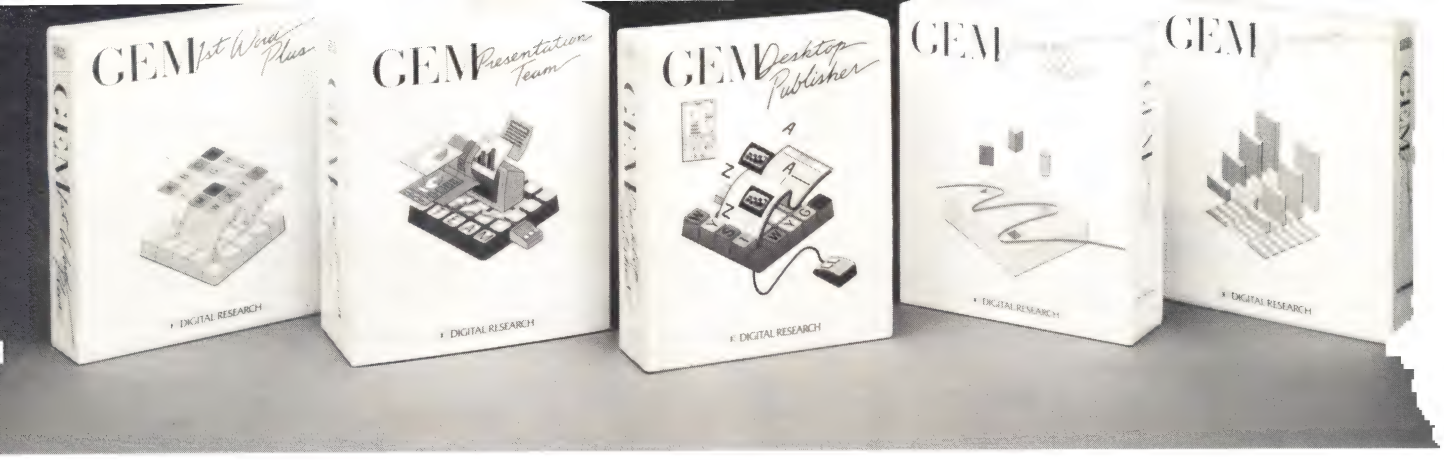

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ROM With a View

No one will ever mistake Tandy's Model 1000 computers for Macintoshes.

But Tandy and Apple have at least one thing in common.

Stewart Alsop

FRED STIMSON

I am really excited about Tandy Corp. I never thought I would say such a thing—after all, less than five years ago, as editor of *InfoWorld*, I approved a cover story headlined, "Radio Shack Improves Its Schlock Image," and Tandy got so angry that it canceled its advertising contract. Tandy's reaction to that story reflected its sensitivity to the constant accusation that it could only serve the Joe Sixpack crowd and would never be a mainstream technology company.

Things have changed in Fort Worth. Tandy is now a mainstream PC company with a tremendously successful line of IBM PC compatibles. It has become the leading home computer manufacturer. It also sells the smallest and least expensive handheld cellular telephone in the world. It is now the only American manufacturer of televisions. It has introduced an erasable optical disk that looks like a sure bet if the company can actually produce what it has promised. And the company is confident that it no longer has to worry about a schlock image.

Most important to personal computer users, Tandy has managed to become the first PC compatibles manufacturer that understands how to make computers as usable and sexy as the Apple Macintosh without abandoning the IBM standard: specifically, the Tandy 1000 SL and TL, introduced in late July.

Tandy has achieved this feat by outROMming the Macintosh. Whether or not you believe the Macintosh is a good computer, Apple is selling them as fast as it can make them. And the reason is the software—the user-interface toolbox and operating system—permanently imprinted within the computer's 256K of read-only memory, or ROM.

Most computer industry executives will tell you it's foolish to put your operating system into ROM, because burning software into a chip makes it difficult to upgrade. But Apple has discovered that the benefits far outweigh the headaches. First, burning software into ROM means that it is much more closely associated with the personality and packaging of the computer, giving it more of the feel of an integrated system. Second, ROM-based software becomes so much a part of the computer that software developers would rather not work around it. The result is a relatively uniform and standardized family of applications software and a computer that's much

(continues)

harder for competitors to reproduce. Third, taking the step of committing your operating software to permanent memory sends a message to users and other important parties that you are really confident about the quality and permanence of your operating software.

Tandy has studied this phenomenon and begun to adapt it to its own line of computers. A year ago, the company introduced the Model 1000 HX, complete with a 128K ROM chip containing the operating system (DOS 2.10) and a small part of Tandy's own *DeskMate* user-interface package. The primary reason for using ROM-based system software was to help the computer start up faster and eliminate the need for a second disk drive for DOS. Having taken that first tentative step, though, the company began to discover the other benefits of putting its operating software in ROM.

So this year when Tandy introduced its new computers, it quadrupled the ROM to 512K and burned in the operating system, the disk format and copy commands, the *DeskMate* user interface and a network interface, an 80,000-word spelling checker, and the video and mouse drivers. In doing so, Tandy has taken a major step toward the leading edge of computer design and begun to redefine what it considers operating software. Both Apple and Tandy include the operating system, the user interface, and the network interface in ROM. But while Apple is focusing on multimedia presentations and mainframe connectivity as new areas for its definition of operating software, Tandy is focusing on text management and communications.

This all sounds very conceptual and gee-whizzy, but in fact there are substantial benefits for the individual user. First, the new Model 1000 is up and running much more quickly than any other computer in its class, because starting software from ROM takes much less time than starting it from disk. Indeed, the Model 1000 TL, based on an 8-MHz 80286 processor, goes

(continues)

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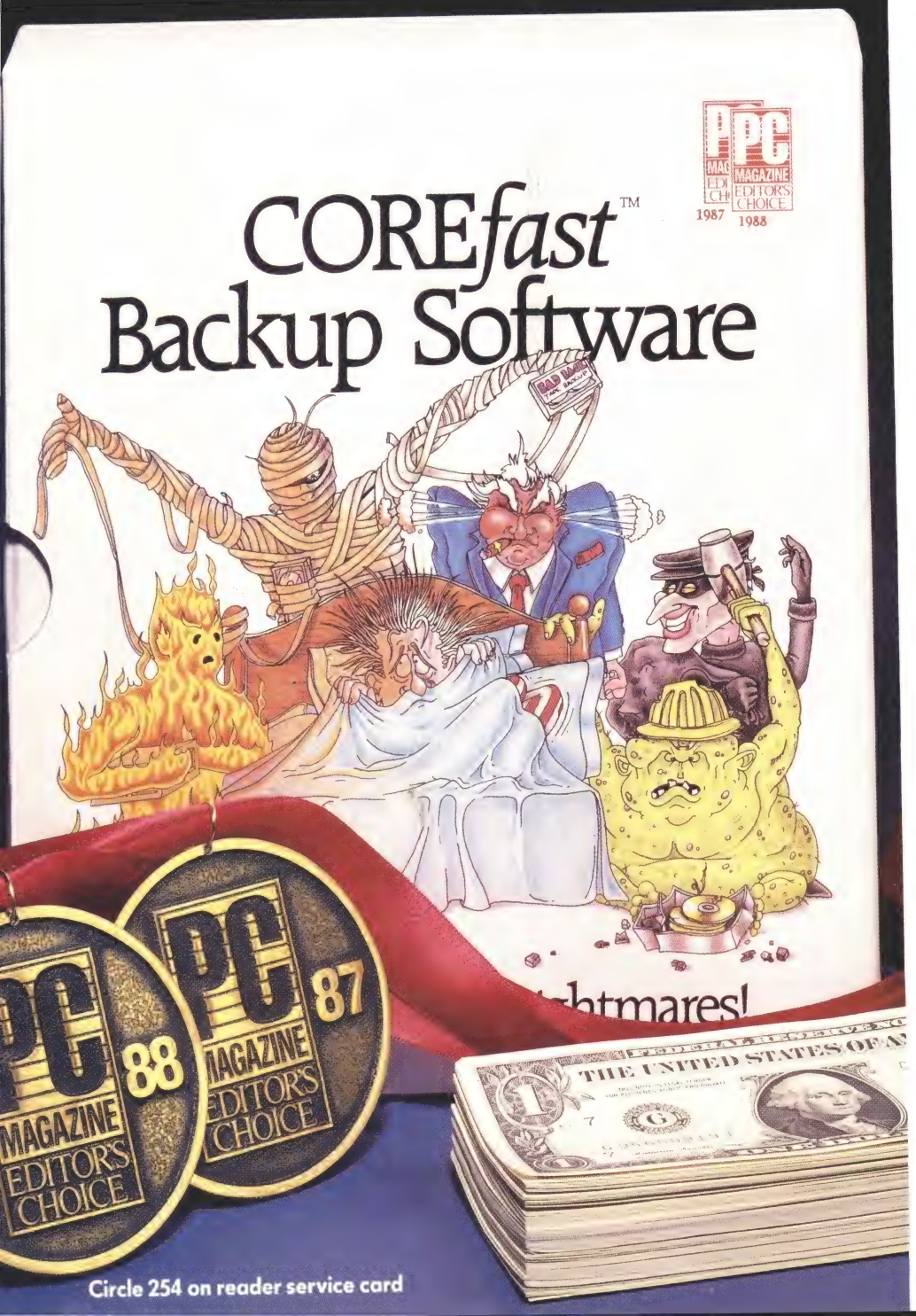

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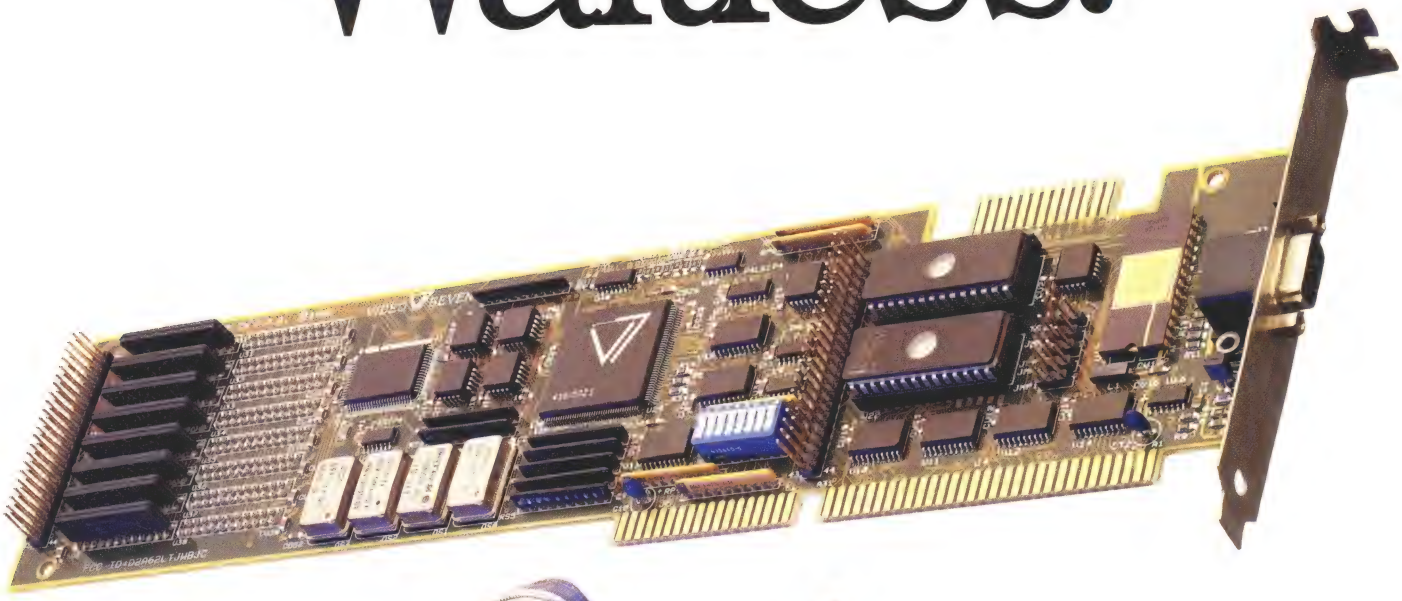

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through the opening command sequence so fast that you barely see the words on screen before you get to the *DeskMate* interface. Second, you get access to special features (such as networking and spell-checking) at any time, although you can take advantage of these features only if the application software is developed specifically for the *DeskMate* interface. Third, Tandy users might end up with a reasonably well-integrated set of applications software that supports the special features of the computer, since Tandy has demonstrated enough commitment to burn these features into ROM. When the new Model 1000s were introduced, 14 companies announced that they would publish versions of one or more programs that support all of the special features of the new computers.

Indeed, my only real complaint about Tandy at this point is that it seems to have decided that the ROM strategy only works for cheap computers. In addition to the Model 1000s, Tandy also has models based on the 80286 and 80386 processors (Models 3000 and 4000, respectively), plus a new 386 computer that uses an IBM Micro Channel–compatible bus (Model 5000 MC). But none of these computers have been blessed with ROM software. Tandy, just like other companies, insists that it doesn't want to restrict the possible markets for the machines by building features that some users might not want. Unfortunately, by building what amounts to generic commodity computers (albeit fast ones), Tandy has also managed to build machines that don't appeal to any particular customer either.

Perhaps the company will learn from the certain success of its brilliantly designed new Model 1000 computers and spread some of that brilliance to its more powerful and more expensive machines. Then the company will be viewed not only as a killer home-computer company, but also as a mainstream supplier to corporate America. ●

Stewart Alsop is editor and publisher of P.C. Letter *and a contributing editor for* PC World.

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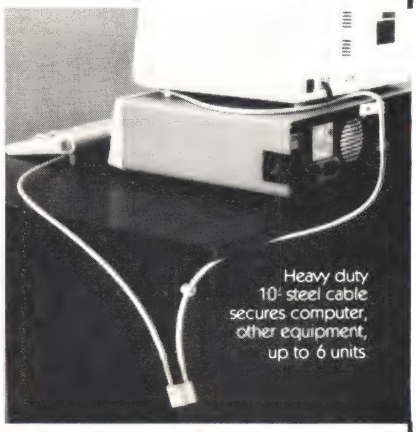

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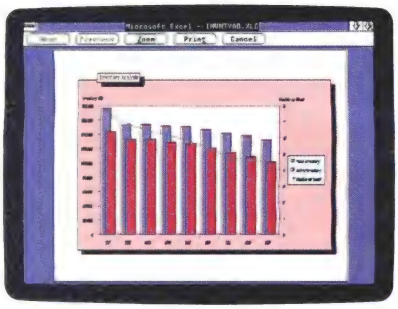

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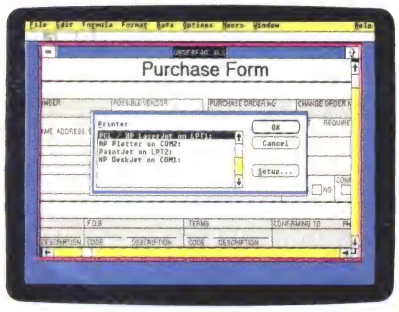

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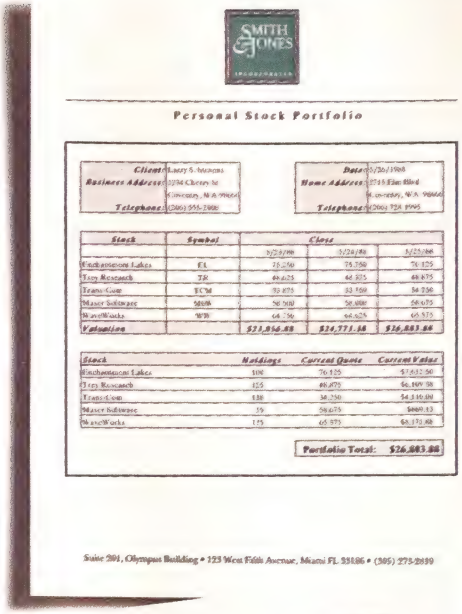

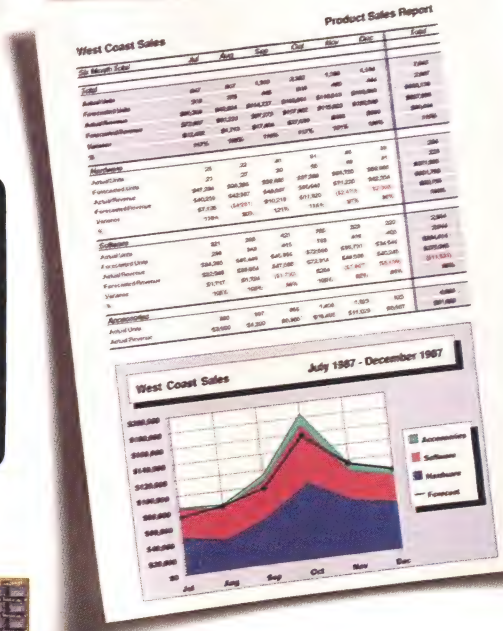

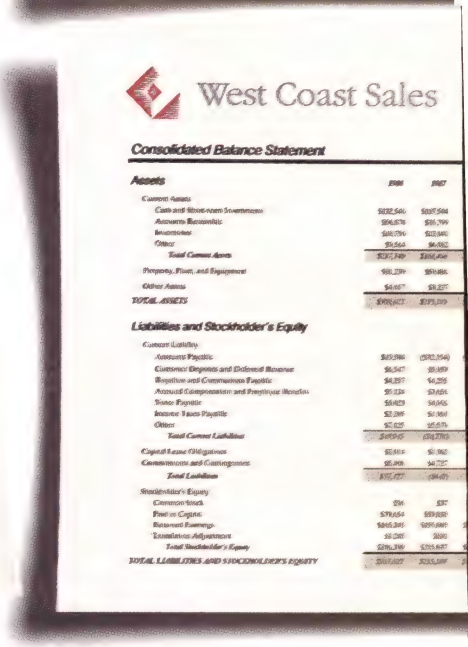

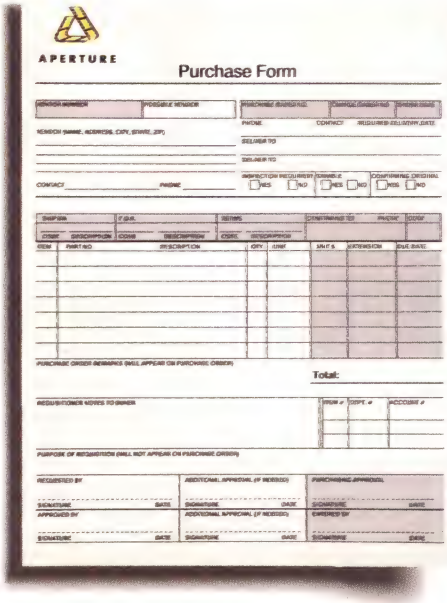

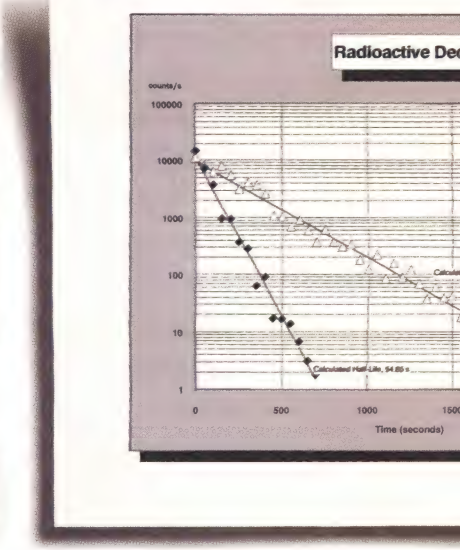

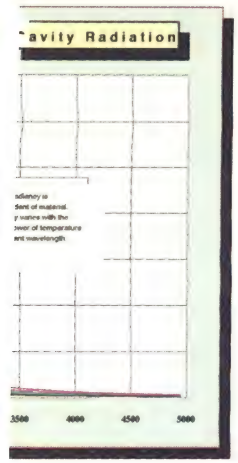

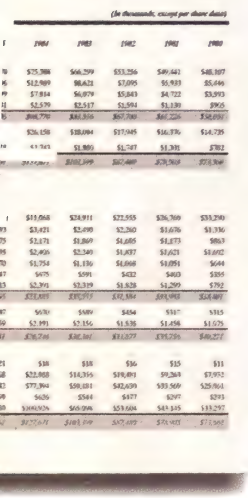

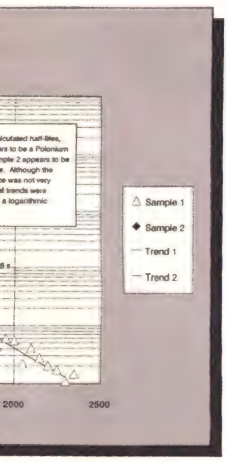

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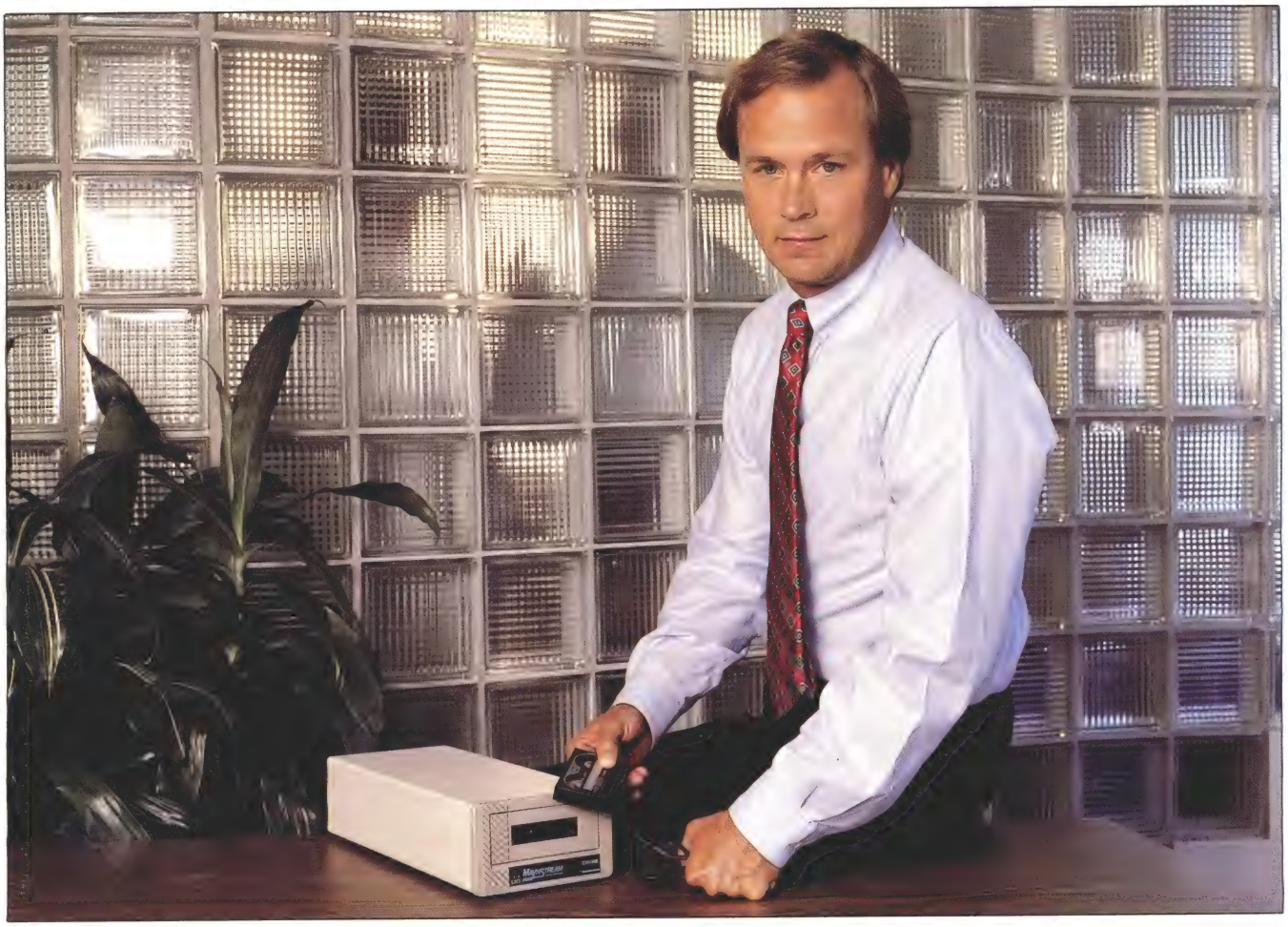

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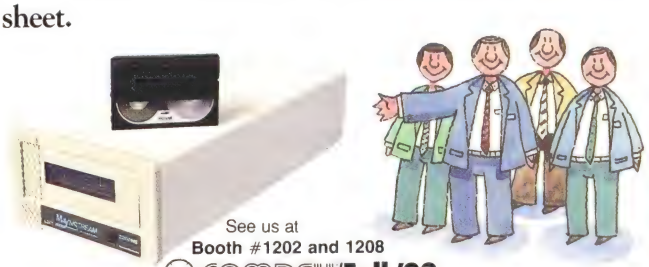

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OS/2: Heard but Not Seen

OS/2 is moving slowly—but the OS/2 Presentation Manager and its kin, Windows, will herald a new generation of applications.

William F. Zachmann

MISSEY HARVEY

It's been exactly a year and a half since IBM introduced the PS/2 line of personal computers and the OS/2 operating system. If IBM's announced delivery schedules are met, the "real" OS/2 versions, complete with Presentation Manager, should be available this month (with IBM OS/2 Standard Edition 1.1) and next (with Extended Edition 1.1).

As the clouds of vaporware finally begin to clear, it's becoming easier to discern the real look and feel of tomorrow's software landscape.

First, there's a growing recognition that OS/2 will not displace DOS any time soon. That's guaranteed by the enormous installed base of 8088- and 8086-based systems (including IBM's PS/2 Models 25 and 30) that will never be able to run OS/2 in any form.

Furthermore, 286-based systems running OS/2 at 8 MHz, 10 MHz, or 12 MHz deliver what is at best barely adequate performance, as the benchmark tests elsewhere in this issue plainly show. Test results confirm what has long been obvious to anyone who cared to look at the matter objectively: Existing 286-based systems (including IBM's PS/2 Models 50, 60, and 50 Z) just don't have the horsepower to be effective OS/2 platforms.

Although running OS/2 on a 286-based system is certainly possible—given enough memory and disk space—doing so offers no clear advantage over relying on any of several DOS alternatives. For the majority of 286 users, *Microsoft Windows/286* delivers more useful capabilities than OS/2 and at a much lower price. Other products, like Digital Research's *Concurrent DOS* and Quarterdeck's *Desqview*, also provide alternatives.

OS/2's high cost and its sluggish performance on a 286 machine make it unlikely that IBM's new operating system will be used on more than a very small percentage of 286 machines—perhaps 10 percent, although it wouldn't surprise me if the actual number were even lower.

Practically speaking, then, OS/2 requires a 386-based system like the PS/2 Model 70 or Model 80, the Compaq Deskpro 386, or similar machines from Acer, AST, Dell, Hewlett-Packard, Tandy, Zenith, and others. What's definitely not required is IBM's Micro Channel Architecture, which offers no significant performance or functional advantages for running OS/2 or anything else.

(continues)

Even on 386-based systems, however, OS/2 will not necessarily outshine DOS alternatives. Many users who have 386 systems equipped with ample memory and storage will obtain more from a product like *Microsoft Windows/386* than from OS/2. For this reason, OS/2's penetration of the installed base of 386s will fall far short of 100 percent for some time to come.

The net result is that, for now, DOS dominates—and will continue to dominate—the world of IBM and compatible personal computers. Only as 386-based systems come to prevail during the next few years will OS/2 begin to have a significant impact on desktop computing.

Under these circumstances, IBM's proprietary OS/2 Extended Edition (EE) is likely to achieve approximately the level of success attained by the company's *TopView* and PCjr. Even hungrier for resources than OS/2 Standard Edition, OS/2 EE is unlikely to be used by anyone but IBM's most dedicated corporate customers—and even then, only by those with unlimited budgets. In themselves, Extended Edition's communications and data management components offer less than do a host of competing entries in the DOS world.

Yet despite OS/2's slow initial acceptance, it would be a serious mistake to discount its impact on application software. Though OS/2 itself will remain a relatively minor presence in personal computer systems for some time, early evidence suggests its impact on applications will be widespread and quickly noted.

The reason is simple. OS/2's influence on applications is only incidentally tied to its multitasking capabilities or its access to address space beyond the DOS 640K limit. Its real impact lies in the Presentation Manager's graphic interface, which is, of course, also basic to the various versions of *Microsoft Windows*.

So while OS/2 will be adopted slowly, it has already stimulated interest in *Windows*. Equally important, this new operating system has defined the intersection of *Windows* and the OS/2 Presentation Manager as the true meeting ground of innovative software development.

Indeed, it's not OS/2 alone but rather the Presentation Manager coupled with *Windows* that es-

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A Clear View To Monitor Quality

tablishes the real watershed in application software for PCs, PS/2s, and compatibles. Together, they're creating a key transition point, which will prove more important than IBM's introduction of the PC and DOS back in 1981.

For compelling evidence one need look no further than the results of this year's *PC World* World Class Awards. *PC World* readers not only awarded *Windows*-based *Excel* Most Promising Newcomer status by a wide margin (19 percent, to OS/2's 3 percent) but also placed it a remarkably close second to Lotus's king of the hill, *1-2-3*, in the spreadsheet category—possibly the best showing by any *1-2-3* challenger ever.

Meanwhile, the number of products written for *Windows* and/or the Presentation Manager mushrooms. The list is formidable: desktop publishing packages like Aldus's *PageMaker*, Manhattan Graphics' *Ready-Set-Go*, and Xerox's *Ventura Publisher;* related products like Z-Soft's *Publisher's Type Foundry* and T/Maker's *ClickArt* collections; graphics programs like Micrografx's *Designer, Graph Plus*, and *Windows Draw*, Computer Support Corporation's *Arts & Letters*, and Zenographics' *Pixie;* utilities like Access Softek's *Prompt*, R's *Hammer & Vise*, Columbia Software's *FormBase*, and hDC's *QuickStart;* and such diverse offerings as Financial Feasibilities' *CFO Advisor*, Palantir's *WinText*, Gupta's *SQL Windows*, Omnis's *Quartz*, and Neuron Data's *Nexpert Object*.

The proliferation of all these OS/2-related programs, along with *Excel*'s impressive showing among *PC World*'s readers (clearly a leading-edge group), indicates potential shifts in software usage akin to those that enabled *1-2-3* to take the crown from *VisiCalc* in the PC's early days. During the next year or two, software written for *Windows* and the Presentation Manager is all but certain to make major gains against older, character-mode DOS applications.

This turn of events, however, means the virtual collapse of IBM's attempts to use OS/2 as a weapon against competitors. It's also a blow to the PS/2 hardware line's clear proprietary direction. Inasmuch as the new software development environment

(continues)

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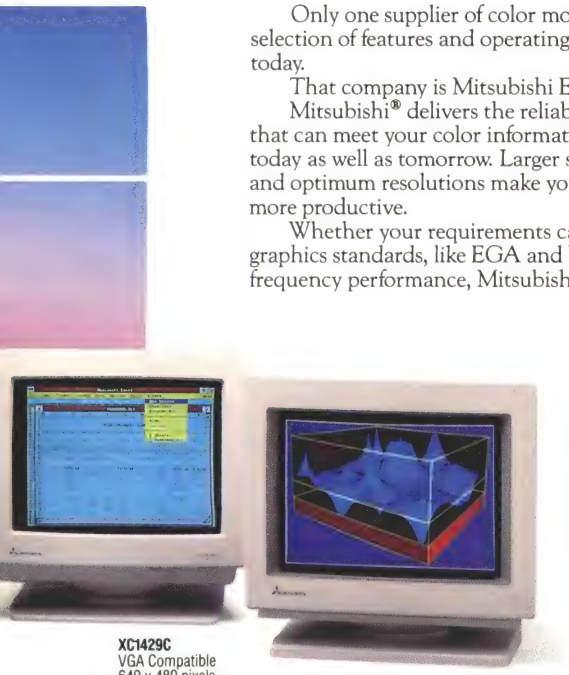

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Diamond Scan 20L* (HL6905TK)	20/19V	30 ~ 64 auto-tracking	0.31				•	•	•	•	•
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Circle 232 on reader service card

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Mid-level, 80286 based

Entry-level, 8086 compatible

Both desk-top and floor-mount models support 5.25″ and 3.5″ internal flexible drives, while the 80286 and 80386 machines will run OS/2.

And every single HP Vectra PC offers something no other PC can: HP's

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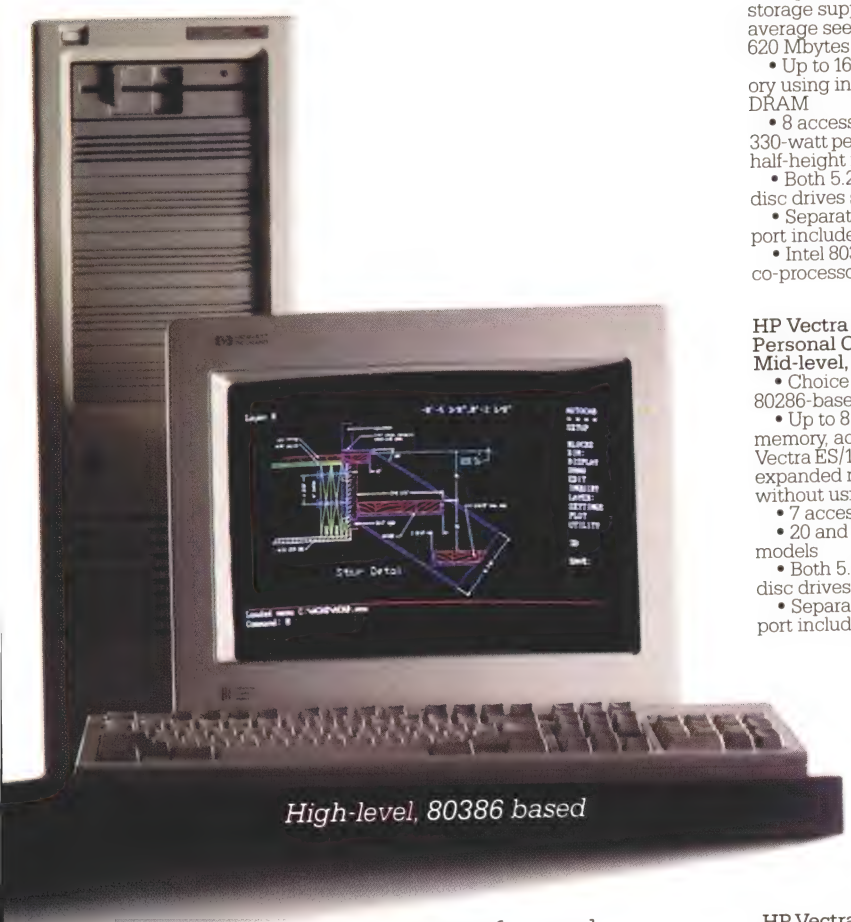
What if...

HP Vectra RS/16 and RS/20 Personal Computers
High-level, 80386 based

- Choice of 16 or 20 MHz, Intel 80386-based microprocessors
- Up to 620 Mbytes hard disc storage supported—17 millisecond average seek time for 100 through 620 Mbytes
- Up to 16 Mbytes of 32-bit memory using interleaved page-mode DRAM
- 8 accessory slots for expansion, 330-watt peak power supply, and six half-height mass storage shelves
- Both 5.25 and 3.5 inch flexible disc drives supported internally
- Separate mouse/graphics tablet port included
- Intel 80387 and Weitek 1167 co-processor support

HP Vectra ES and ES/12 Personal Computers
Mid-level, 80286 based

- Choice of 8 or 12 MHz, Intel 80286-based microprocessors
- Up to 8 Mbytes of expanded memory, accessed at 12 MHz in the Vectra ES/12 PC, supporting LIM 4.0 expanded memory specification without using I/O slots
- 7 accessory slots for expansion
- 20 and 40 Mbyte hard disc models
- Both 5.25 and 3.5 inch flexible disc drives supported internally
- Separate mouse/graphics tablet port included



High-level, 80386 based

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- 7 accessory slots for expansion
- 20 Mbyte hard disc model
- Both 5.25 and 3.5 inch flexible disc drives supported internally

HP Portable Vectra CS Personal Computer
8086 compatible

- 7.16 MHz, 8086-compatible microprocessor with zero wait states
- Up to 6 Mbytes expanded memory, addressable by LIM 3.2
- Four I/O slots
- Supports two 3.5 inch flexible disc drives
- 20 Mbyte internal hard disc model available
- Up to 10 hour battery life
- IBM style keyboard

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Circle 131 on reader service card

will rely on OS/2 Standard Edition 1.1 (rather than IBM's proprietary Extended Edition), OS/2 Presentation Manager, and *Microsoft Windows*, IBM's efforts to seize the initiative from its hardware competitors are doomed to failure. ●

William F. Zachmann is senior vice president at International Data Corporation.

POWER TIP NO. 14

1-2-3 to dBASE III Plus Transfer

To convert a *1-2-3* .PRN file to a *dBASE III Plus* SDF (system data format) file, load *1-2-3*, select /Print File, and enter the file name. Then select Options and set all margins to zero. Next, issue Other Unformatted Quit Go to print the file, and select Quit to return to Ready mode. Exit *1-2-3* and load *dBASE III Plus*. To create a corresponding SDF file in *dBASE III Plus*, type the command Use *filename*.DBF at the dot prompt and press <Enter>. Then, type Append From *filename*.PRN SDF and press <Enter>. This conversion works only for fields no more than 239 characters long. *1-2-3* creates an extra carriage return/linefeed at 240 characters.

Roy Moore
Director of Technical Support, Ashton-Tate
Torrance, California

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You'll find one at the back of this issue.

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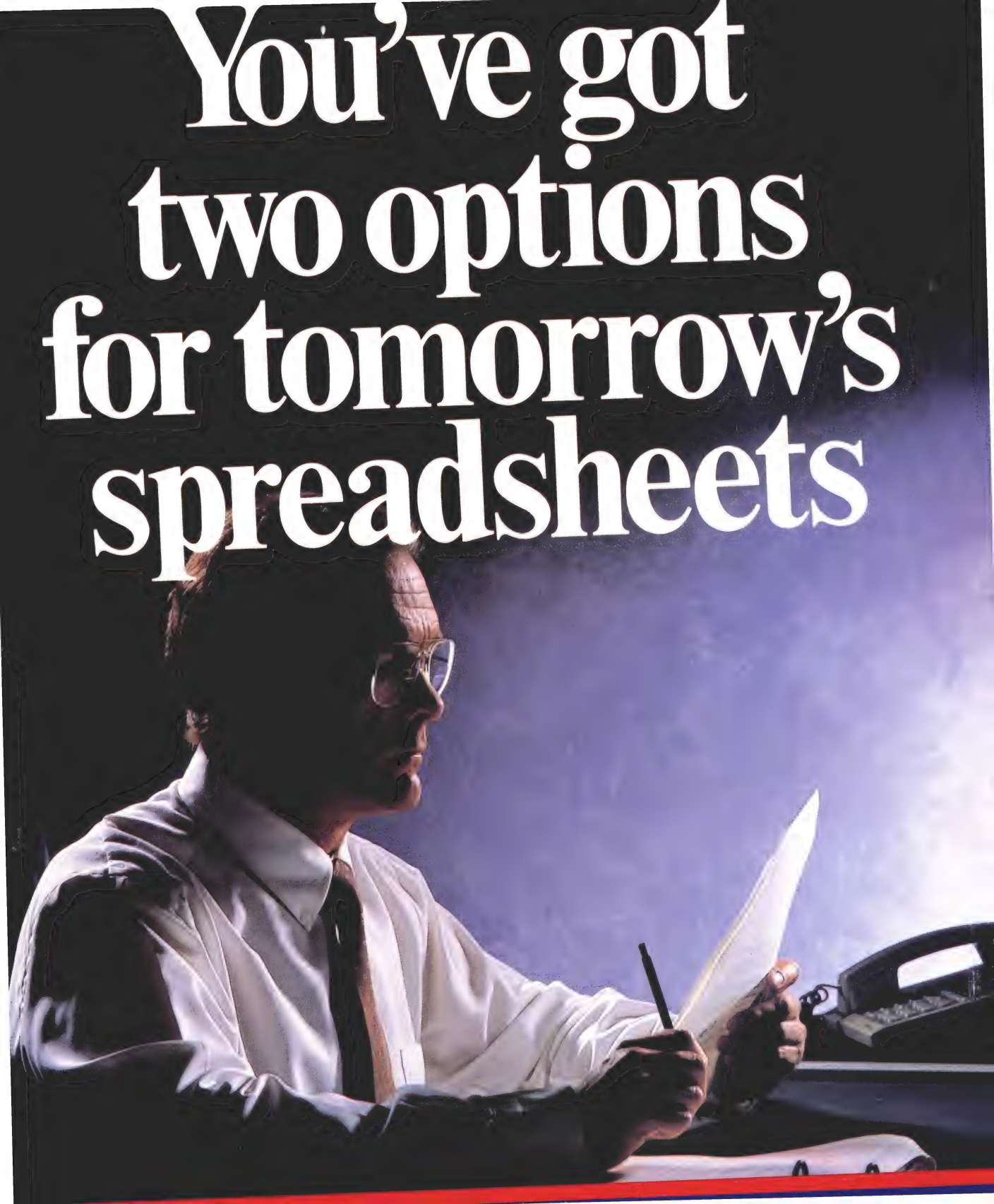
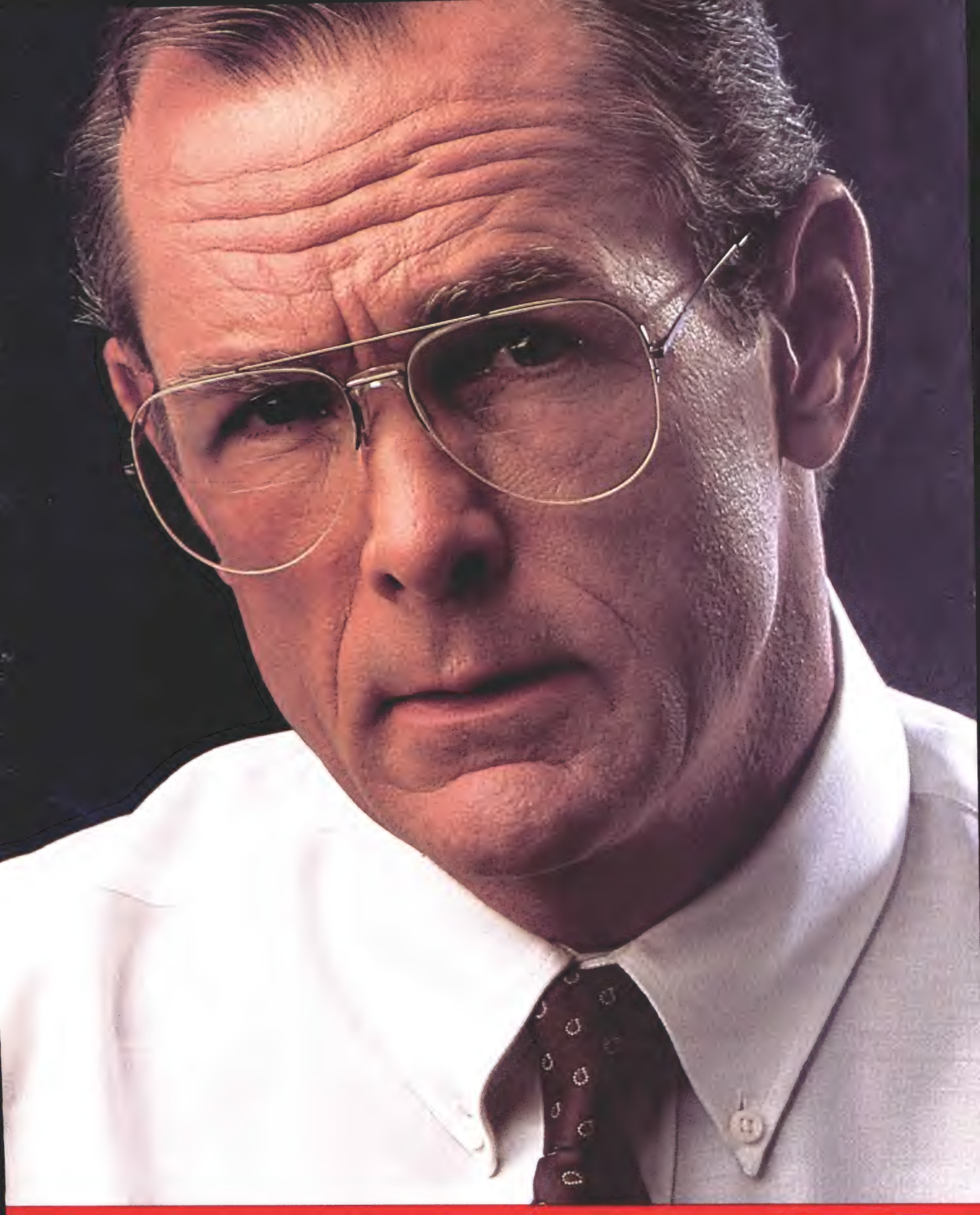
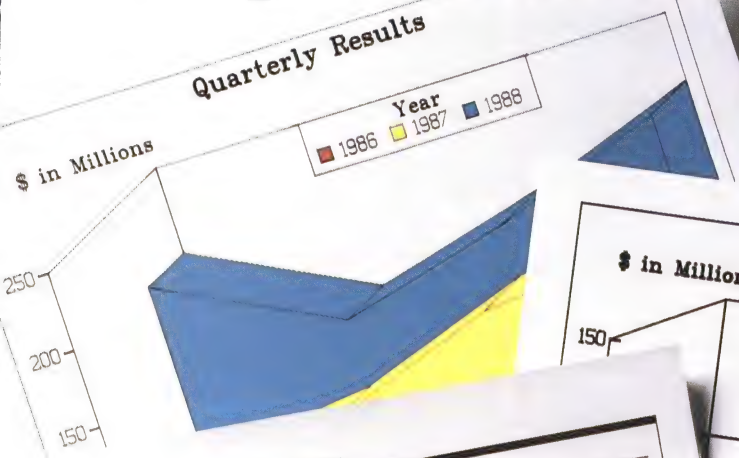
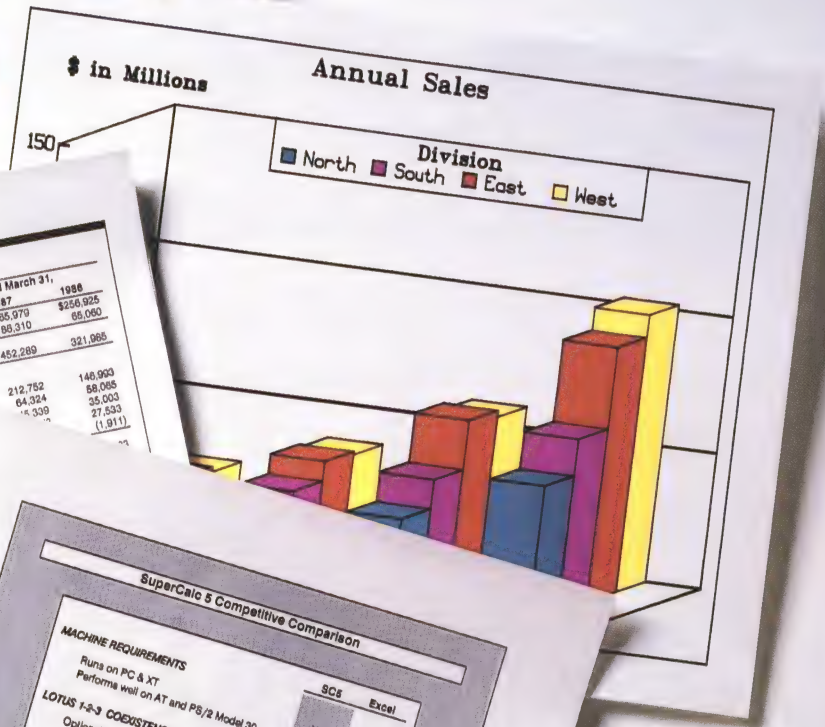
You've got two options for tomorrow's spreadsheets

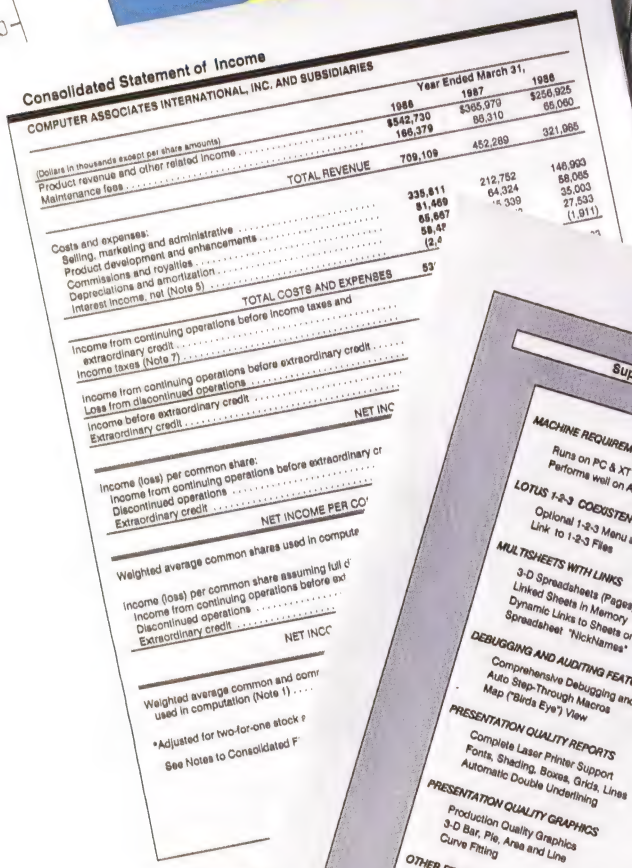




Compare tomorrow's spreadsheets today.







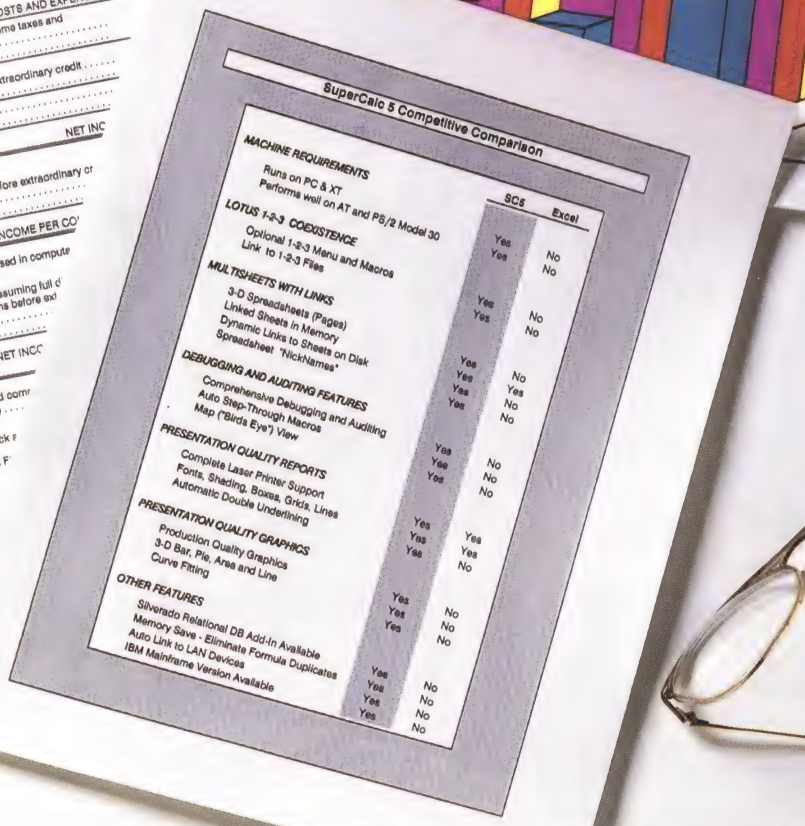
Consolidated Statement of Income

COMPUTER ASSOCIATES INTERNATIONAL, INC. AND SUBSIDIARIES

(Dollars in thousands except per share amounts)	Year Ended March 31, 1988	1987	1986
Product revenue and other related income	$542,730	$365,979	$256,925
Maintenance fees	166,379	86,310	65,060
TOTAL REVENUE	709,109	452,289	321,985
Costs and expenses:			
Selling, marketing and administrative	335,811	212,752	146,993
Product development and enhancements	81,469	64,324	58,065
Commissions and royalties	65,667	[illegible]	35,003
Depreciations and amortization	58,4[illegible]	[illegible]	27,533
Interest income, net (Note 5)	(2,[illegible]	[illegible]	(1,911)
TOTAL COSTS AND EXPENSES	53[illegible]	[illegible]	[illegible]
Income from continuing operations before income taxes and extraordinary credit	[illegible]	[illegible]	[illegible]
Income taxes (Note 7)	[illegible]	[illegible]	[illegible]
Income from continuing operations before extraordinary credit	[illegible]	[illegible]	[illegible]
Loss from discontinued operations	[illegible]	[illegible]	[illegible]
Income before extraordinary credit	[illegible]	[illegible]	[illegible]
Extraordinary credit	[illegible]	[illegible]	[illegible]
NET INC[illegible]	[illegible]	[illegible]	[illegible]
Income (loss) per common share:			
Income from continuing operations before extraordinary cr[illegible]	[illegible]	[illegible]	[illegible]
Discontinued operations	[illegible]	[illegible]	[illegible]
Extraordinary credit	[illegible]	[illegible]	[illegible]
NET INCOME PER CO[illegible]	[illegible]	[illegible]	[illegible]
Weighted average common shares used in compute[illegible]	[illegible]	[illegible]	[illegible]
Income (loss) per common share assuming full d[illegible]			
Income from continuing operations before ext[illegible]	[illegible]	[illegible]	[illegible]
Discontinued operations	[illegible]	[illegible]	[illegible]
Extraordinary credit	[illegible]	[illegible]	[illegible]
NET INC[illegible]	[illegible]	[illegible]	[illegible]
Weighted average common and comm[illegible] used in computation (Note 1)	[illegible]	[illegible]	[illegible]

*Adjusted for two-for-one stock [illegible]

See Notes to Consolidated F[illegible]



SuperCalc 5 Competitive Comparison

	SC5	Excel
MACHINE REQUIREMENTS		
Runs on PC & XT	Yes	No
Performs well on AT and PS/2 Model 30	Yes	No
LOTUS 1-2-3 COEXISTENCE		
Optional 1-2-3 Menu and Macros	Yes	No
Link to 1-2-3 Files	Yes	No
MULTISHEETS WITH LINKS		
3-D Spreadsheets (Pages)	Yes	No
Linked Sheets in Memory	Yes	No
Dynamic Links to Sheets on Disk	Yes	No
Spreadsheet "NickNames"	Yes	Yes
DEBUGGING AND AUDITING FEATURES		
Comprehensive Debugging and Auditing	Yes	No
Auto Step-Through Macros	Yes	No
Map ("Birds Eye") View	Yes	No
PRESENTATION QUALITY REPORTS		
Complete Laser Printer Support	Yes	No
Fonts, Shading, Boxes, Grids, Lines	Yes	No
Automatic Double Underlining	Yes	No
PRESENTATION QUALITY GRAPHICS		
Production Quality Graphics	Yes	Yes
3-D Bar, Pie, Area and Line	Yes	Yes
Curve Fitting	Yes	No
OTHER FEATURES		
Silverado Relational DB Add-In Available	Yes	No
Memory Save - Eliminate Formula Duplicates	Yes	No
Auto Link to LAN Devices	Yes	No
IBM Mainframe Version Available	Yes	No
	Yes	No
	Yes	No
	Yes	No

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Take credit for savi
a workstation by cl

Introducing SuperCalc5.
Tomorrow comes in a blue and red box. *SuperCalc5* is the spreadsheet of the future, ready for you today. Its power and flexibility are remarkable yet switching to *SuperCalc5* won't disrupt your office. First of all, it works with the hardware you most likely have on your desk right now, including all IBM PC,® XT,® AT® and PS/2™ models and compatibles with 512k memory.

In use, *SuperCalc5* holds up to 256 spreadsheets in memory and allows you to view and manipulate any three of them on the screen at any one time. Direct links can be established with spreadsheet files in memory, on disk or on a network. And these can be either *SuperCalc* or Lotus 1-2-3® files. This means with *SuperCalc5* you can access information located in spreadsheet files anywhere else in your company. There's even a version for your company mainframe called CA-SuperCalc.

But even more than this, *SuperCalc5* is designed to coexist with Lotus 1-2-3, with compatibility unmatched by any other spreadsheet. Not only does it read, write and link to Lotus 1-2-3 files automatically, *SuperCalc5* also includes an optional 1-2-3 menu and can use 1-2-3 macros. You can even move Lotus 1-2-3 macros into *SuperCalc5* and then back again if you wish.

Accuracy and speed.
Comprehensive *debugging and auditing* features are built right into *SuperCalc5.* When used along with the *undo* feature, they ensure that errors in your worksheets and macros or even an inadvertent wrong key will not cost more than you can afford.

SuperCalc5 works fast because it has *minimal and interruptible recalculation* and the ability to choose

ing at least $6,000 hoosing SuperCalc5.

recalculation ranges. This means that only changes and those areas of the worksheet which you choose are recalculated. And *SuperCalc5* automatically eliminates formula duplications, saving memory and disk space. *SuperCalc5* supports LIM Version 4.0, providing up to 32 MB of memory.

Tomorrow's spreadsheet doesn't require tomorrow's hardware.
SuperCalc5 has been designed for MS-DOS and to bridge the migration to OS/2. In fact, it performs very well under OS/2 Compatibility Mode.

So you're most likely ready to install *SuperCalc5* on your computer right now. And the comfortable coexistence with Lotus 1-2-3 means that you'll never isolate users of *SuperCalc5*.

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SuperCalc5 has automatic installation and its intuitive command structure means that you can be up and running in 10 minutes.

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Choosing the right option.

You could get a spreadsheet which delivers much of what you expect but requires that you purchase the newest high end IBM workstations today. This could also require extensive retraining and the conversion of all of your files and macros. Furthermore, coexistence with users of other spreadsheets will be anything but comfortable. This option is likely to cost at least $6,000 for every workstation.

There is another choice. It delivers everything you expect from the spreadsheet of tomorrow. The choice is *SuperCalc5.*®

Edited by ERIC BENDER

Overexpectations for Integration?

Presentation Manager Readies for Graphics

Wave of Software Expected

Developing Presentation Manager applications will be worth the effort, promises Micrografx CEO Paul Grayson.

ROBERT CARDIN

When OS/2's Presentation Manager finally materializes this month, will the graphic user interface begin to deliver what customers expect?

Like other such platforms, the Presentation Manager promises to enhance ease of use and learning, consistency among applications, and the quality of what-you-see-is-what-you-get output. Unlike its competitors, it has been blessed by both IBM and Microsoft. Riding on a robust next-generation operating system, the Presentation Manager should offer "a level of modularity and consistency users have never had before," says David Gilmour, general manager of Lotus's Advanced Products Division. "The real benefit is flexibility—allowing users to piece systems together."

The Presentation Manager offers a clearer landscape than does *Microsoft Windows*, notes Paul Grayson, chief executive of Micrografx in Richardson, Texas. For instance, the file manager lets you give applications normal English descriptions rather than DOS file names (see the preview "Windows on OS/2," *PCW*, September 1988). "The user doesn't need to know as much as under *Windows*," Grayson says.

But not everyone is overwhelmed by the Presentation Manager. "It's not a particularly graphic interface," maintains Jeffrey Tarter, publisher of the *Soft-letter* newsletter in Cambridge, Massachusetts. "When you fire up a Macintosh, you're immediately in a graphics environment that's relatively easy and intuitive to use. With the Presentation Manager, you're really still dealing with a lot of DOS commands and file directories. The machinery is only partly covered."

Those who see the Presentation Manager as twin to the Mac are living in fantasyland, Tarter feels. "A lot of the enthusiasm for the Presentation Manager comes from people who haven't seen it but have very high expectations."

"If there is any area where the Presentation Manager has been oversold, it's in the level of integration that will automatically flow to multiple vendors' applications," Gilmour says. The Presentation Manager enforces much commonality, but, says Gilmour, "some areas of functional integration among applications have nothing to do with the environment."

Most immediately, how will Lotus, Ashton-Tate, and other vendors move their entrenched, character-based interfaces into the Presentation Manager? "Lotus is caught between a rock and a hard

(continues)

386 Software Booms

DOS Dominates

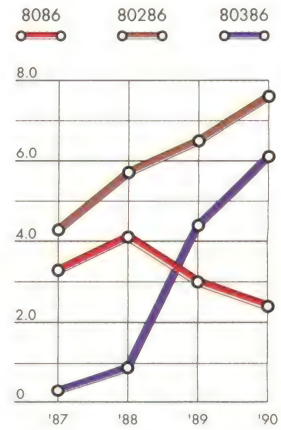
While the ballyhoo builds for OS/2, software that turbocharges DOS for 80386-based machines probably will see more customer action than OS/2 this year.

Written for Intel's 80286, Microsoft's next-generation system software ignores the 386's ability to work on 32-bit data chunks and run multiple DOS sessions. Customers are going home with the various third-

(continues on page 78)

Worldwide PC Shipments

(in millions)



Source: Dataquest

Dataquest estimates show rapid growth in shipments of Intel 80386-based machines. But the installed base of 80286-based PCs will far outnumber them until well into the 1990s.

Viruses and Trojans Strike—But Very Rarely

Lowering Risks of Downloaded Danger

PHILIP ANDERSON

Whether you think that computer viruses are urban myths or a real and growing threat, taking a few security precautions makes sense, according to the experts.

A *virus* is the software equivalent of an infectious intruder—a program that secretly attaches itself to program or system files, then reproduces on other systems through file exchange. The purpose may be as benign as flashing a holiday greeting or as malevolent as reformatting hard disks. A *Trojan horse*—a much more common hazard—differs from a virus in that it is unable to replicate itself.

Much of the concern about viruses has been exaggerated. "Whenever anyone runs into a Trojan, they call it a virus," says Robert Mahoney, operator of the Exec-PC bulletin board in Shorewood, Wisconsin. "Whenever someone runs into a poorly written program that happens to have an unintentional bug that deletes some files, they call it a virus."

Richard tenEyck, telecommunications director for the Boston Computer Society, published an article on viruses and received more than two dozen calls from people who claimed they were victims. But he found every one of them was suffering mundane glitches—such as data being mangled by power outages, telephone line noise, or operator error.

Much of the ballyhoo over viruses has been whipped up by purveyors of "vaccines." Loren Jones, Law and Computer Fellow at Chicago's Illinois Institute of Technology, Kent College of Law, published a letter decrying the fuss over viruses and received a call from a company claiming to have over 30 viral strains in captivity. He was told that these were, in fact, so dangerous that the firm could not show him any. Unsurprisingly, the company sells vaccine programs.

None of the bulletin board operators we polled had ever encountered a bona fide virus, but the PC kingdom has been hit by a few verifiable attacks. "PCs are enjoying a little bit of false bravado," says tenEyck. "It's only a matter of time before some smarter virus brings a couple of systems to their knees."

Users divide into high- and low-risk groups, says Steve Gibson, president of Gibson Research in Laguna Hills, California. Low-risk users, who stick strictly with commercial

(continues)

Presentation Manager

(continued)

place," says Jeff Raikes, Microsoft's director of applications marketing. *1-2-3*'s current look is fundamentally incompatible with the Presentation Manager's, and Gilmour acknowledges that the conflicts present difficult design choices.

That's just the beginning. Clipboards may not always work between various vendors' products—a problem that plagues *Windows*. Additionally, mechanisms to build hot links for shooting data between applications are still in flux, and none will provide a generic, automatic connection between offerings from different suppliers.

"Developers have to work together," Grayson says. "It's not just an issue of guidelines or specifications, it's an issue of cooperation." This cooperation will grow over time if the Presentation Manager follows the Mac model, suggests Raikes: "The more applications that come out, the more consistency."

Gilmour expects "a layered story" on integration—starting with packages that look like each other and progressing through increasingly tailored data-exchange facilities, with the tightest fits among each supplier's product families.

Overall, the Presentation Manager's development "may be a bit more difficult than some people think; it may be a slower burn," Grayson says. "But it's very seductive to a developer to have this kind of an environment with this kind of push from the industry."

While a few applications (quite possibly including *Excel*) are expected to ship in the fourth quarter, the bandwagon won't pick up much speed until 1989. In the meantime, all agree, users should start acquiring the requisite high-power hardware but should wait for compelling applications before making the switch. "The transition is going to be slow and messy," Gilmour advises. —*Eric Bender*

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HEWLETT PACKARD

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Print samples were created using Microsoft Word, Microsoft Excel, and Aldus PageMaker.

Circle 26 on reader service card

IBM Finds a Metaphor for Analysis

A Model for a Future Presentation Manager?

Yet another breakthrough at Xerox's fabled Palo Alto Research Center is making its way into the personal computer world. This time, IBM rather than Apple will cash in.

Earlier this year, IBM inked a joint development agreement with Metaphor Computer Systems that should create an OS/2 version of the company's Metaphor Data Interpretation System (MDIS). Combining Structured Query Language (SQL) queries with spreadsheets, graphics, text, and other tools, MDIS analyzes data from large, distributed data bases. Based loosely on the Xerox Star, the object-oriented iconic environment currently runs on proprietary network workstations, but the IBM product will use 80386-based PS/2s.

Data bases don't have to be ugly, says Metaphor chairman David Liddle.

The Metaphor alliance calls for a $10 million investment (about 10 percent of the Mountain View, California, firm's value) and extensive sharing of technology. IBM will own exclusive rights to future Metaphor technology, but Metaphor will continue to sell its workstation-based system.

Founded in 1982, the private 380-employee company realized $40 million in sales last year. It primarily targets marketing departments in Fortune 500 companies—including Procter & Gamble, which bought its own $10 million stake in Metaphor.

While an IBM version of MDIS should offer formidable competition for decision analysis tools expected from Lotus and others, the agreement may have more far-reaching consequences. Should Apple win its look-and-feel lawsuit against Microsoft, Metaphor could provide a litigation-proof alternative to Microsoft's Presentation Manager. But it's doubtful the move was made to skin Apple—negotiations preceded the lawsuit.

Rather than replace the Presentation Manager, it's more likely that IBM will include some aspects of Metaphor's icon-based interface in future versions. The interface may also show up on larger systems in IBM's Systems Application Architecture.

"A future version of the Presentation Manager might incorporate some of the Metaphor technology,"

(continues)

Viruses

(continued)

software, shouldn't give the problem a second thought. But high-risk users, who frequently download from bulletin boards or exchange software via floppy disk, are taking small but real gambles. Gibson recommends employing a vaccine program that will monitor software and warn you if a program takes a suspicious action like altering COMMAND.COM.

However, truly sophisticated virus authors can circumvent vaccines, and tenEyck and Jones advise users not to bother installing the vaccines. Instead, they recommend prudence in the acquisition of public-domain software. "Don't hang around unpedigreed bulletin boards," says Jones. "It's the same rule of thumb for not getting social diseases." Does the operator check out users? Are uploads restricted to registered users? Does the operator keep tabs on the file collection? Also, boards with paid subscribers are far less likely targets than free ones, and game software harbors Trojans more often than do utility or application packages.

Mahoney recommends letting a file "age" for at least two weeks on the board before downloading it. Other veterans say to be wary of any downloaded program that doesn't come with a documentation file or tell you how to contact the author. Also steer clear of any file that contains COMMAND.COM. If you're unsure of a program, list out the code. "Some fool will write 'Ha-ha! I gotcha!' in the statement line," says Robert Connolly, operator of The Unicorn's Inn bulletin board in Salem, Massachusetts.

If you can, test out any downloaded program on a machine without a hard disk, and start it from a write-protected floppy. Also, whenever you format floppies, do so with your original DOS diskette—also write-protected. In an office, make sure that any "foreign" disks are labeled as such and handled with care.

What should you do if you're convinced your system has come down with a virus? Don't reboot—it will give viruses a chance to reinstall. Don't run CHKDSK, for some viruses glom onto that file to access every sector on your disk. Do stop what you're doing, make backups, and get professional help. The Boston Computer Society recommends that you enlist the aid of a good PC consultant—and avoid security consultants who specialize in viruses.

—*Judy Getts*

Small cash input for laser-quality output.

HEWLETT PACKARD

Dear Reader:

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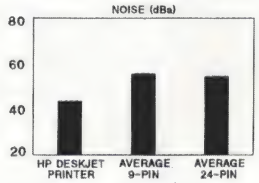
The HP DeskJet Printer.

It prints text and graphics more crisp and clear than 24-pin printers. And as you can see from the chart, it's a lot quieter than 24-pin printers, too.

PRINTER NOISE LEVELS



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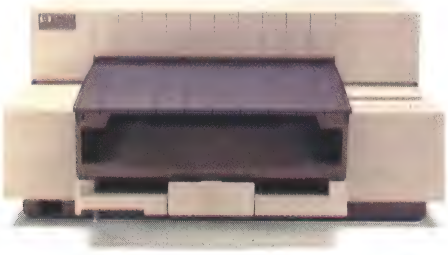

Circle 39 on reader service card

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HEWLETT PACKARD

Metaphor

(continued)

says David Liddle, chairman of Metaphor and a codeveloper of the Xerox Star with Metaphor president Donald Massaro. However, Liddle points out that the design philosophies of the two products are far apart. "People look at the Metaphor system and say, 'Well I guess we'll be seeing this on the Mac or the Presentation Manager pretty soon.' Not soon. They would have to start over again to do this."

Analysts agree that merging the products may be more trouble than it's worth. "IBM wants to stuff Metaphor's object-oriented skills into a future version of the Presentation Manager, but that's not a trivial task," says Molly Upton, a senior analyst at International Data Corporation in Framingham, Massachusetts.

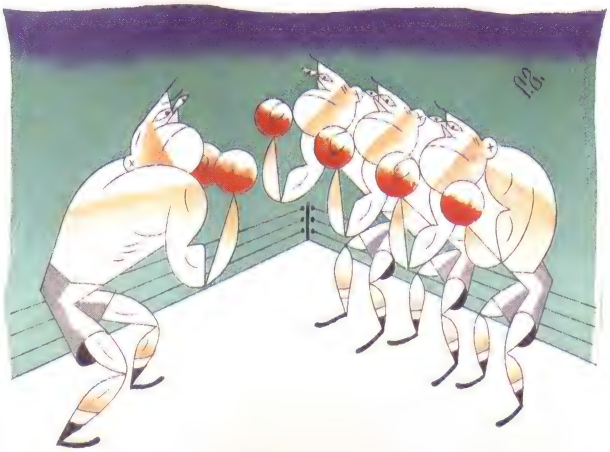
The chief distinction between Metaphor and other icon-based interfaces is Metaphor's graphics programming environment. Metaphor's approach eases the creation of complex applications by stringing together icon-based "application capsules," which can incorporate several other files and tools, each in its own icon-tagged capsule. You click on any tool you need. Among other strategems, you can mask intricate SQL queries by building them graphically with arrow icons. "In other interfaces, icons just open files, but Metaphor icons really jump through hoops for you," says Upton. "There's a lot of action behind each icon."

Adds Liddle, "Companies are doing fine with *dBASE*-size data bases, but they're not very good at analyzing large ones. Metaphor can help by shielding the statistical ugliness of data bases."

One of the first accomplishments of IBM's Applications Systems Division, the Metaphor alliance could serve as a model for many such deals as Big Blue tries to muscle further into the software business. The giant is reaching out for expert help—and it won't stop with Microsoft. —*Eric Brown*

Ashton-Tate Defends Title Again

dBASE IV—Late, but Great?



PHILIP ANDERSON

After almost three years in the ring, Ashton-Tate's *dBASE III Plus* still rules among data base packages, but contenders are landing heavier blows. After many delays, *dBASE IV* is scheduled to finish training by late September, so this month should tell if Ashton-Tate still packs a knockout punch.

With more than 2 million copies sold, *dBASE* easily dominates the personal computer data base market. Ashton-Tate accounted for half of all PC data base sales last year, and "*dBASE IV* will keep them from slipping, if they were in danger," predicts Randy Sutherland, an analyst with Dataquest in San Jose, California.

"Customers who like *dBASE* products continue to use them almost regardless of what other people do," comments Larry Foster, senior vice president for purchasing at Egghead Software in Bellevue, Washington. In Foster's view, this cult is unlikely to abandon Ashton-Tate. *dBASE IV* boasts a glossier front end, an upgraded application generator, query by example, a built-in compiler, and at least preliminary steps towards serious SQL capabilities. "It's an incredible product," says Foster. "*III Plus* users will undoubtedly switch right over."

Others disagree, noting the inroads of fast and powerful *dBASE* clones that already incorporate *dBASE IV* features. *Softletter* publisher Jeffrey Tarter sees the market splintering into factions pitting products compatible with *dBASE III* against those compatible with *IV*. Corporations have very little incentive to upgrade, he maintains, unless they really need those new features. "The *III* market is bound to stay large for a very long time, and the aftermarket has lots of opportunities.

"Ashton-Tate doesn't control the market just by coming out with a new version," Tarter explains. "*dBASE* is now a commodity product." He also points to threats like the joint development arrangement that will combine WordTech's *dBASE*-compatible front end with Oracle's SQL back ends, offering big-machine support that Ashton-Tate is many months away from matching. "That deal is the first in a landslide," he says. —*Eric Bender*

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Erasable Opticals

Maxtor's 1-Gigabyte Tahiti

Soon after Tandy surprised the industry by unveiling THOR last spring, an erasable CD ROM due in 1991, Maxtor Corporation of San Jose, California, raised the stakes in the optical contest with a faster, higher capacity erasable-optical drive due late this year.

Maxtor's $5995 5¼-inch Tahiti will read and write both 650MB and 1-gigabyte removable media at an average seek time of 30ms. The company also announced the $1995 Fiji, a 160MB 3½-inch erasable drive running at 100ms. Both drives are based on magneto-optical technology, which mixes laser optics with traditional magnetic techniques.

Previous announcements of erasable-optical drives by Olympus, Sony, and Verbatim have indicated slower speeds than the Tahiti's, suggesting competition with tape backup. But Maxtor's model may be able to compete in the larger Winchester market. The Tahiti will be marketed through PC manufacturers and system integrators, possibly Advanced Graphic Applications, a New York City–based controller board maker, which has pledged to deliver a complete retail subsystem with its DOS drivers before year-end.

CAP International of Norwell, Massachusetts, predicts rapid growth in 5¼-inch erasable-optical drives, with 3000 units sold this year, jumping to 50,000 units in 1990 and 176,000 in 1992. Whether optical drives can catch up with Winchesters depends largely on pricing.

"The gap between optical and magnetic drives has narrowed dramatically," says Scott McCready, associate director at CAP. However, he notes that the Fujitsu 778MB 16ms Winchester sells for $3170, little more than half the Tahiti's price, although the Tahiti's cost is likely to fall early next year.

Despite higher prices, the advantages of media removability, higher capacity, and data reliability should entice many users. So far, removability has been limited to small-capacity magnetic drives, and Winchester reliability tends to decrease at higher capacities and speeds. Due to their better reliability, erasable-optical drives may initially find a home on factory floors.

One question nagging the write-once, read-many (WORM) drive vendors that are expected to ease into the erasable product market is how the new products will affect sales of write-once drives. Sony has yet to begin full-scale production on its 750MB erasable drive, and Panasonic and Sharp are watching from the sidelines.

Analysts remain undecided about the potential impact on WORM sales. "Erasable drives will be the preponderance of optical drives shipped by 1991, but they won't kill off write-once," predicts Bob Katzive, vice president of Disk/Trend in Mountain View, California.

Effects on the tape-backup market are also uncertain. "People have been looking at erasable-optical as a replacement for tape backup, but that's not going to happen," says Abigail Shaw, a senior analyst for Rothchild Consultants in San Francisco. However, Shaw predicts that reliable optical drives may pose a more indirect threat to tape. "If optical drives replace Winchesters, users won't need tape backup."

Additionally, upcoming standards are delaying moves. The International Standards Organization is expected to establish optical guidelines within a year. Many vendors hope for standards that would allow full media interchangeability between write-once and erasable drives, thus lowering the cost of media.

Meanwhile, more drives will debut by year-end, and Olympus and other vendors may actually beat Maxtor out the door.

"We'll be seeing products that will be competitive with midrange Winchesters," says Shaw. If true, while small magnetic drives should remain competitive for a long time, the high-end business may soon belong to erasable-optical. —*Eric Brown*

386

(continued)

party offerings that do just that.

"We're pleasantly surprised," reports Richard Smith, president of Phar Lap Software in Cambridge, Massachusetts, which sells DOS extension tools. "We see the market splitting into OS/2 and DOS, with DOS dominating the market for at least five years." Smith expects to see around 200 DOS applications by year-end.

Terry Myers, president of Quarterdeck Software in Santa Monica, California, says that 80386-specific packages really began to take off last spring. "A year ago we would be talking only about FORTRAN; now it's data base, computer-aided design, typesetting, and others."

Fox Software, in Perrysburg, Ohio, began shipping its *Foxbase+/386* in July 1987. "Obviously the main advantage is speed; you get about a fourfold increase," says marketing director Richard Ney. "The major use is for incredibly large data base applications—500,000 records or more." Borland and Symantec also offer versions of their data base managers, and other major competitors will follow suit.

Many users want to run multiple DOS packages rather than OS/2 applications. Myers won't give numbers for *Quarterdeck Expanded Memory Manager 386*, the *Desqview* complement, but says it's selling very well. And Microsoft shipped more than 250,000 copies of *Windows/386* in the first nine months. —*Eric Bender*

Eric Brown and Judy Getts are both PC World *contributing editors.* ●

TWO-FISTED MANAGEMENT
NEXT TIME I WON'T BE SO DIPLOMATIC
1988
marek 32
Hello, John, how's the business?
Fine, Arnold, fine. And you?
FIRM, FORCEFUL HAND-SHAKE
Have a seat
No, I insist, you first.
No, no, no
please, after you
SQUINT
GLANCE
GENTLEMEN??
Yes, I'll be having the "coq au vin" with the "vinaigrette" new potatoes."
HEH HEH HEH
Yes, er, make mine a 14oz. t-bone and a baked potato, Russian dressing
SNICKER!
WAIT, WAIT. let me change that to "Steak Tartare" with a half pint of horseradish and a tall mug of beer.
TWO steaks and a pitcher of manly, warm stout !!
chef Salad, the works
Scungilli casserole
pizza
Lasagna
SCARF
SMAK
CHOMP
GULP
SLURP
DESSERT?
OW!
OMI-GOD
Well, yeh (urp) a thick slice of your chocolate mud pie, hot coffee
(gag) (urp) triple layer cheese-cake, espresso
Milk shake, 3 scoops
strudel
donuts
Baklava
plate of whipped cream
shot of whiskey
GASP
FEW CAN MATCH ARNOLD HARRIS IN A ONE-ON-ONE POWER LUNCH.
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MARK MAREK

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In Touch with Tomorrow

TOSHIBA

Toshiba America Inc., Information Systems Division

Ventura Turns Pro

By releasing two versions of Xerox Ventura Publisher 2.0, Xerox will simultaneously court the "make it easier" bunch and the "give me more" crowd.

Ted Nace

If the strategists behind *Xerox Ventura Publisher 2.0* are right, the world of desktop publishing has split into two camps. One is made up of hard-core advanced users—those who spend day in, day out, dragging mouse to menu bar, craving ever more features and speed. This bunch doesn't much care if the learning curve is slippery and steep, so long as the view is great once they've clawed their way to the top. The other group consists of beginners and casual users who prefer a gentler slope and wouldn't mind parting with a few typographic niceties in return for ease of use.

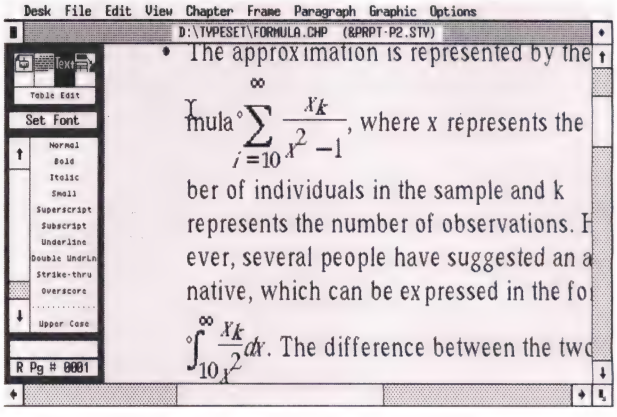
To satisfy both groups Ventura software has created *Xerox Ventura Publisher 2.0* and *Xerox Ventura Publisher 2.0: Professional Extension.* With over 70 enhancements, the $895 version 2.0 improves substantially over *Ventura 1.1.* The *Professional Extension* (an add-on expected to cost another $595) offers just 4 new features—table generation, equation formatting, vertical justification, and cross-referencing—but they dramatically extend the program's power. *Professional Extension* also supports expanded memory and has a hyphenation dictionary.

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

Beginner's Delight

If nothing else, *Ventura 2.0* will appeal to new users. You're no longer forced to switch to the proper mode before taking an action. You can perform many common operations without leaving the current mode, such as selecting and moving a graphic in graphics mode without first switching to frame mode.

Also welcome are the 250 context-sensitive help screens, accessed by clicking a small question mark in the corner of every dialog box. Although the screens are limited to a maximum of 40 words each, they eliminate a lot of flipping through the manual.



After you create an equation using Ventura's equation generating function, the results are inserted directly into text. Ventura automatically adjusts the line spacing of the paragraph to make room for the equation.

Finally, *Ventura*'s haphazardly organized menus are now put in order, with functions grouped in more logical locations. Keyboard shortcuts have also been increased.

A Myriad of Small Touches

Beyond ease of learning, *2.0* will satisfy the appetites of veteran users. Nothing earth-shattering here—the big stuff was saved for the *Professional Extension*—but like Swift's Lilliputians, the enhancements do add up. *Ventura* will now:

- Align text vertically at the top, bottom, or middle of a page, a frame, or box text.
- Anchor a frame within a line of text, enabling you to embed an

image in the middle of a paragraph.

- Print out style-sheet and tag listings—a boon for business publishers who format numerous documents.
- Import scanned images and graphics in the TIF format.
- Allow you to enter true fractions, using either the diagonal or the horizontal style.
- Create custom colors and print color separations.

Other changes make *Ventura* easier and faster to use. For example, *Ventura* remembers where the cursor was the last time a list was opened.

In short, *Ventura*'s rough edges have been smoothed out. However, Ventura president John Meyer admits that version 2.0 will be 10 to 15 percent slower than its predecessor, due to its additional formatting features.

Going Pro

The *Professional Extension*'s features do more than break new ground for desktop publishing—they plow up a whole new field. Question is, will you need them? If you're producing newsletters or short manuals, probably not. But if your work involves publishing financial reports, books, forms, mathematical publications, or very long manuals, the answer is yes.

The most notable new feature is automatic table generation. Although you were always able to create tables in *Ventura* using tabs or the Box Text command, the job required patience. With *Professional Extension*, selecting a few commands pops a matrix onto the screen. To customize the grid, you highlight one or more cells, then select table-editing options that combine, split, stretch, or shrink cells; alter the grid lines; and add text. One drawback: At press time, the program did not provide a way to load data from a spreadsheet or data base into a table.

If you're publishing technical papers or a math textbook, take a look at the *Professional Extension*'s equation formatting feature. To insert an equation, you select an option that splits the screen in half and type the equation into the top half using an equation-generating language called EQN. *Ventura* displays the result at the bottom of the screen. Press a key, and the equation pops into the text.

Those producing books and other documents where text must fill a certain vertical space will appreciate *Ventura*'s new vertical justification feature. The program incrementally analyzes the situation, adding space first between frames and text, next between paragraphs, and finally between lines.

The last feature—cross-referencing—is key to true Just-In-Time publishing. Not only can you cross-reference a chapter, page number, figure number, or table number anywhere in a document, but you also can define and reference a number of different variables. For example, you can create a conference agenda and represent the unknown speakers with variables; supply the names at the last minute, and *Ventura* reformats the entire document and plugs in the names.

Divide and Conquer

PC World will put both of these feature-rich versions of *Ventura* through their paces after they debut in September; for now they promise to increase the product's considerable market lead over *PageMaker*. *Ventura* also plans to butt heads with *Interleaf Publisher* and other network-oriented publishing systems by introducing *Xerox Ventura Publisher 2.0: Network Server*. The company claims the package will run on 3Com, Novell, and PC Net networks and will permit users to share style sheets, mark style sheets as read-only, and use different printers within the network. ●

Contributing Editor Ted Nace is the coauthor of LaserJet Unlimited, Edition II, *and the author of* Ventura Tips and Tricks, Edition 2 *(both by Peachpit Press, 1988).*

SNAPSHOT

Xerox Ventura Publisher 2.0

Ventura is now three products—2.0, the "base" version, which includes over 70 minor enhancements; the *Professional Extension*, an add-on for creating complex tables and very long documents; and the *Network Server*, which offers some work-group publishing features.

KEY FEATURES

- **On-line help and reorganized menus**
- **Style-sheet listings, frames anchored in text, and color separations**
- **Automatic table generation**
- **Vertical justification**
- **Cross-referencing using variables**
- **Equation formatting**

AVAILABILITY

Ventura 2.0 and the *Professional Extension* should be released by September 1988; the *Network Server* should appear sometime before the end of the year.

PRICING

Xerox Ventura Publisher 2.0 $895; *Xerox Ventura Publisher 2.0: Professional Extension* $595; *Xerox Ventura Publisher 2.0: Network Server* $1295; upgrade from 1.1 to 2.0 $85

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NEC

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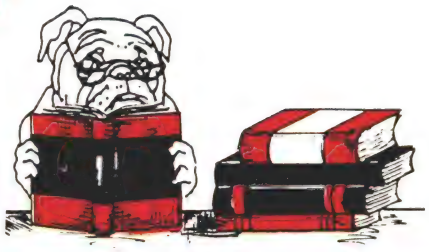

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PRODUCT OUTLOOK

87 PRODUCT OUTLOOK

STEP 386/25
Power users: The STEP 386/25 boasts a state-of-the-art processor and proprietary memory-caching scheme, and you can tailor the system to fit.

ErgoPrint 610
The ErgoPrint 610 delivers laser output with the fully automated paper/envelope-handling finesse of a photocopier.

D the Data Language
A fully relational data base manager insulates non-experts from many of the perils of data base programming and commands.

PicturePower
Add employees' pictures to personnel rolls or import images into your desktop publishing program.

Music/386
A cheap and easy, if slow, way to share processing time, this DOS-compatible multiuser environment best suits data base or accounting applications.

Screen Extender
Break *WordStar*'s 25-line-by-80-column viewing limit by squeezing on-screen type with this memory-resident program.

Back to Basics: Professional
Easy, basic accounting software that lets home-based small businesses track cash in and cash out.

94 BRIEFLY NOTED

V-RAM VGA
Color graphics performance rockets ahead on the first VRAM-based graphics board.

Smartmodem 9600
Hayes tackles big-time communications with a full-duplex modem that links LANs and mainframes.

R:base for DOS Runtime
Microrim's compiled *R:base* gives developers a new bag of tricks for creating cheaper and faster apps.

AMI 386 AT Mark 2 Motherboard
Beef up your AT with a 386 motherboard that includes memory caching.

Hummingbird Browser
Cut and paste from *dBASE* into word processing or spreadsheet files with a RAM-resident utility.

ScanMan
Scan graphics, photos, and text with a hand-held scanner, then enhance the images with its graphics editor.

Forget-Me-Not
Run programs unattended or send a preset message to yourself or other members of your work group with this TSR.

98 UPDATE

PFS: First Publisher 2.0
The new version blends basic capabilities with greater control of text and images.

Norton Commander 2.0
View *1-2-3*, *Symphony*, and *dBASE* files from within a DOS shell.

DacEasy Accounting 3.0, Payroll 3.0, Graph+Mate 3.0
DacEasy enriches its data base, *Payroll* acquires new skills for employee-file management, and *Graph+Mate* beautifies reports—plus pulldown menus for all.

Turbo Prolog 2.0
Prolog gets an interpreter and builds large data bases with a fraction of the code that 1.0 requires.

Tree86 2.0
A utility that performs speedy backups and supplies a helpful directory tree with pulldown menus.

10Net Plus
Menu-driven installation, E-mail, and resource sharing among nodes are a few benefits of this distributed LAN.

XtreeNet
Executive Systems' disk management utility gears up for networking with password protection and file housekeeping.

Mike Hogan

STEP 386/25

Quick Step

If you're the average computer user—doing a little word processing here, running an occasional spreadsheet there—you may not feel the need for more than the standard AT-style system. On the other hand, your spreadsheets may be so large that during recalcs you can watch the cell changes ripple across the screen. Or you may manage a data base that the U.S. Census Bureau would envy. If so, you want every extra megahertz you can get. You'll find top speed and more in Everex's STEP 386/25.

Besides using a state-of-the-art 25-MHz Intel 80386 processor, the system exploits a proprietary memory access scheme that boosts throughput by providing both read and write caching. Depending on the application, your most frequently used data will be waiting for you in cache between 93 and 99 percent of the time. Furthermore, the cache uses a "128-bit" data path (actually 4 consecutive 32-bit accesses) and is directly mapped (as opposed to indexed), thereby providing the quickest possible access. Everex's cache can be enlarged from a standard 64K cache for the base configuration's 1MB of memory to 256K when you push out to the STEP 386/25's upper limit of 16MB of main memory.

If you want top speed, Everex's STEP 386/25 gives you a 25-MHz 80386 processor and a proprietary memory access scheme that boosts throughput to a blazing 6.13 MIPS.

The net result is a scorching 6.13-MIPS (million instructions per second) throughput rate.

The STEP 386/25 cache-memory system enables zero-wait-state access of 8MB of memory on the motherboard and an additional 8MB on an add-in board in its proprietary 32-bit memory slot. For I/O, the STEP 386/25 uses a standard AT-compatible bus with six 8/16-bit slots and a single 8-bit slot.

A $5999 base system comes with a 16-bit hard/floppy disk controller (supporting 1:1 interleave), serial port, parallel port, and 101-key keyboard. You also get a 1.2MB floppy drive, front-panel space for up to five half-height mass-storage devices, and DOS 3.30. An 8-character LED display on the front panel gives you power-up and disk-performance diagnostics. Also included are sockets for a 25-MHz Intel 80387 math coprocessor and a 25-MHz Weitek 3167 coprocessor.

The STEP 386/25 comes without a hard disk, graphics adapter, or monitor, since Everex expects its customers to be power users who will want to configure their systems in unique ways. You can choose from among three 28ms hard drives—a 40MB unit ($600), an 80MB unit ($900), and a 160MB unit ($2500). Your dealer will provide display adapters and monochrome and color monitors from which to choose.

You don't have to be an expert user to configure the STEP 386/25. Everex lets you configure your system for add-on cards and hard drives without setting jumpers or DIP switches on the motherboard. Everex Systems, 48431 Milmont Dr., Fremont, CA 94538; 800/356-4283.

ErgoPrint 610

The Paper-Full Office

What ever happened to the paperless office? Its imminence was hailed by soothsayers of the electronic age, but it never dematerialized, so to speak. While many of us exchange messages by electronic mail and share files via electronic data-transfer schemes, there comes a time in the life of every important report, memo, or spreadsheet when it has to be reduced to black and white.

The American office still travels on hard copy —and one copy is never enough. Add the need to alternate letterhead with second sheets and collate reports, and that trusty office-automation relic, the photocopier, seems as secure as the watercooler.

But now BDT Products has introduced an office tool that combines the paper-handling capabilities of a collating copy machine with the speed, resolution, and electronic transfer capabilities of a laser printer. No more standing in line at the

The ErgoPrint 610 will let you load and sort different-size paper and envelopes like a copy machine and adds the speed, resolution, and electronic transfer capabilities of a laser printer.

copy machine—the ErgoPrint 610 laser printer can queue the output of 10 to 15 users, thanks to its seven input and ten output trays. Handling and collating paper and envelopes are fully automated.

Ideal for a network environment, the ErgoPrint 610 lets you direct printer output to the desired bins via embedded print commands. You can have a marketing proposal printed and sent to one set of collating bins, while related memos, correspondence, and envelopes go to another set. The 610 operates unattended for more than 5 hours and produces up to 25,000 sheets and envelopes a month. Of course, you also can treat it as a standard copier, although it copies only 1 sheet at a time.

Equipped with a 10-page-per-minute Xerox 4046 print engine, the ErgoPrint 610 can access 7 types of paper automatically during printing and recognizes up to 32 types of paper and envelopes stored in its input trays. The 610 has five 250-sheet paper trays, one 1000-sheet tray, and another that holds 200 envelopes, including Monarch sizes. Ten standard output bins each hold 180 sheets of facedown output. An additional offset stacker holds up to 750 sheets while the printer sorts individual print runs, and doubles as an overflow bin when a selected output bin is full.

The ErgoPrint 610 ships with 1MB of memory, Xerox 2700 and Diablo emulations, and RS-232C serial and Centronics parallel interfaces. It's compatible with Novell's *Netware*, ethernet, and most other popular networks. Resident fonts include Titan 10 in portrait mode and XCP-14 in landscape mode. HP LaserJet and Epson emulations are optional. A day of training is included in the ErgoPrint 610's $16,900 price. BDT Products Inc., 17152 Armstrong Ave., Irvine, CA 92714; 714/660-1386.

D the Data Language

A Thin Skin

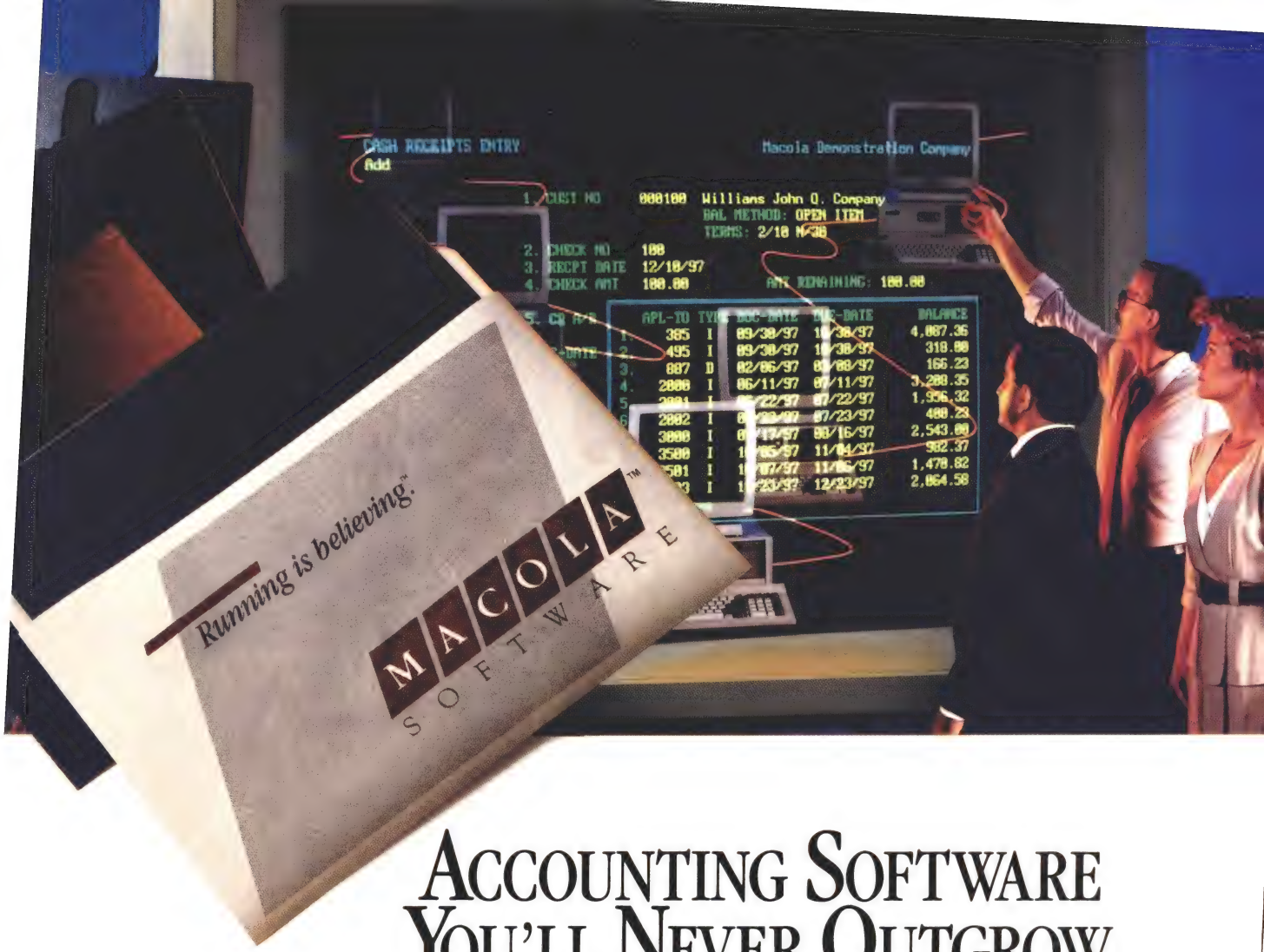
Data base managers are supposed to make molehills out of mountains of information. But how many data management programs gather dust because they require you to climb a steep learning curve? Even many of the best-selling data base programs seem determined to drag you up into programming heights where the oxygen is mighty thin.

But now Caltex Software puts the power of a fully relational data base at your fingertips, even if you don't have a degree in computer science. Like all truly rich fourth-generation data base management systems, *D the Data Language* incorporates its own programming language. But you'll maneuver through it in comfort, insulated from the rocky twists and turns of data base syntax by its limited command set and menu system.

Even though *D* offers the full range of data base capabilities, it puts the thinnest possible layer of commands between you and your data. The company claims a single command can perform up to ten times the functions of most data base languages. *D* also reduces programming by letting you isolate the subset of data you need to use in your present operation so that you don't have to apply data base filters to the entire data base. Regardless of how many records the data base holds, you'll focus only on those of interest.

You can set up as many records with as many fields as you like, limited to 4088 characters per record. You can store as many files as your hard disk holds and keep any

D the Data Language offers the full range of data base powers but puts the thinnest possible layer of commands between you and your data—a single command can perform ten times the functions of most data base languages.



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13 Integrated Modules

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number of them open at once. *D* sorts across all data base files with a single command because it exploits an unusual indexing scheme that loads all of the data into a single open file.

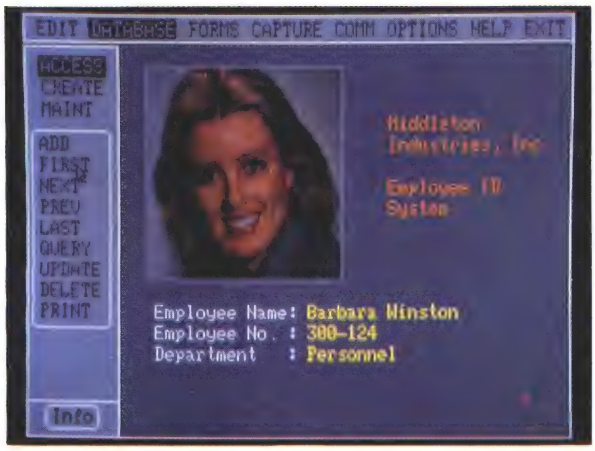
You can build menus containing flashing light bars, pop-up windows, and help screens to guide you or your co-workers through an application. Multiple users can select these aids with point-and-shoot commands. Existing data files can be imported or exported in most formats, including *dBASE* (import only), DIF, and ASCII delimited.

D the Data Language requires DOS 2.00 or a later version, 512K of memory, and a hard disk. The retail price is $395. Caltex Software, 3131 Turtle Creek Blvd. #1101, Dallas, TX 75219; 214/522-9840.

PicturePower

Words and Pictures

Words and pictures go together like soup and sandwich—everywhere but on the computer. There, incompatible file formats have proven an expensive impediment to the marriage of the two information forms. But no more. Now, PictureWare has used the IBM PS/2's graphics capabilities to develop a relatively cheap way of putting faces next to names in your employee data base, or product images on your parts list.



PicturePower takes advantage of the PS/2's advanced graphics capabilities, letting you store and retrieve pictures in an internal file manager that uses the dBASE file format.

PicturePower is a picture data base system that allows you to capture color or black-and-white images from any video source—a VCR or a video camera, even a TV—using a cable and an image-capture board, then lets you store them in a data base.

Picture-file management works just like data base management—you store and retrieve pictures (along with numeric and/or text descriptions) in an internal file manager that uses the *dBASE* file format. You can add pictures to an existing *dBASE* or ASCII-compatible data base, such as an employee roster or parts list, or you can create your own library of images for use in a desktop publishing program. *PicturePower* images are stored in *dBASE* as .DBP character fields. Once the images are linked to *dBASE* fields, you can access them transparently from your *dBASE* applications without using *PicturePower*.

Mouse-driven pop-up menus make it easy to move between *PicturePower*'s modes for capturing images, editing them, and creating image data bases. In image-edit mode, you manipulate an image using the mouse; flip it, crop it, zoom and "airbrush" it down to the individual pixel level; even reverse it from color to a black-and-white "negative" with up to 16 shades of gray.

Like any data base, each *PicturePower* data base has an accompanying form file that explains where to display fields on your screen and includes your annotations. *PicturePower* even has a communications module that lets you exchange *PicturePower* files with remote devices via a Hayes-compatible modem. Also included is an add-on utility for converting *PicturePower* files to TIFF, the standard desktop publishing format. Thus, any desktop publishing package that supports TIFF can import images from *PicturePower*.

Before the advent of the PS/2, you would have had to spend thousands of dollars for such a system since, in addition to the $995 software, you also would have had to purchase an analog monitor, a video display board, and an image-capture board. But the PS/2 features an analog monitor and VGA graphics with enhanced display capabilities built in, eliminating the need for a display board. Even hardware prices have dropped, so now you need only buy a copy of *PicturePower* and a $250-to-$1000 image-capture board from ATD/Zucker, Digital Vision, Jovian Logic, or Sigma Designs.

PicturePower will also run on a classic PC, but you must add the cost of an analog monitor and a capture/display board such as one of TrueVision's Targa boards or Everex's Vision 16. Even with the PS/2, you may want to add a video camera, which ranges in price from $1000 to $12,000. PictureWare, 111 N. Presidential Blvd., Bala-Cynwyd, PA 19004; 215/667-0880.

Music/386

Orchestrating Processor Sharing

The virtual operating mode of the 80386 chip lets multiple users share the multifaceted processing not possible with its predecessor, the 80286. However, exploiting that capability while ensuring full DOS compatibility is a

TI's OmniLaser 2106.
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TI's OmniLaser 2106. It's the laser printer of your future, as well as the one you need right away. The OmniLaser family also includes the 2108 small-cluster printer and the 2115 shared-resource printer. **For a free brochure on how to choose a laser printer and information about TI's on-site warranty, call 1-800-527-3500.**

TEXAS INSTRUMENTS

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challenge most multiuser system makers have dodged.

But not Bristol Systems. Rather than use a UNIX shell or its own superset of DOS, Bristol has introduced *Music/386*, a multiuser software environment that boasts perfect coexistence with the often finicky operating system. *Music/386* takes advantage of the 386's virtual mode to create as many as five 640K memory partitions for a like number of users, employing DOS BIOS for complete compatibility with the large library of DOS-based software.

Music/386's downside is common to all multiuser environments: sluggish processing speed when multiple users attempt simultaneous processing. Those who think that AT-level performance is slow should consider installing a network. But if you're satisfied with the response time of a fast XT, you'll be happy with *Music/386*.

The optimal operating environment for *Music/386* is one where processing is heavy and screen display requirements are minimal, virtually ruling out offices dedicated to word processing. Prime candidates are offices oriented toward data base applications—inventory and point of sale, for example—as well as accounting. In both cases, instantaneous display response is not a priority.

Unlike a network, the *Music/386* system is easy to learn and install. In most instances, the company claims, you can install it in less than 10 minutes. Just copy the program into a subdirectory of the main system and step through the setup program to partition your memory.

Bristol markets *Music/386* as a simple, relatively fast, and—at $386 for 3 users or $586 for 11 users—very inexpensive solution to processor time-sharing. The program requires 640K of memory for each partition and DOS 3.00 or a later version. The company also offers a bundle: *Music/386*, a Link PC dumb terminal, a cable, and a three-user license for $996. Bristol Information Systems, 84 N. Main St., Fall River, MA 92720; 617/679-1051.

Screen Extender

See More of What You Get

It seems hard to believe in this era of bit-mapped graphics, but *WordStar* was perhaps the first WYSIWYG program. Unlike so many of its early competitors, *WordStar* let you see on screen where pages would break, where margins would fall, and how lines would be spaced when you printed your document. *WordStar* hasn't changed; trouble is, you can never see as much of your document on screen as you would like without shelling out for expensive add-on boards or massive monitors. Even EGA and VGA boards buy you only 43 and 50 lines of text, respectively.

But Staircase Software offers a much cheaper way to break the standard 25-line-by-80-column limit and view a full page of text on screen. *Screen Extender* for *WordStar Professional 4.0* is a memory-resident program that compresses on-screen type so you can see up to 58 rows and 180 columns simultaneously, depending on your graphics adapter.

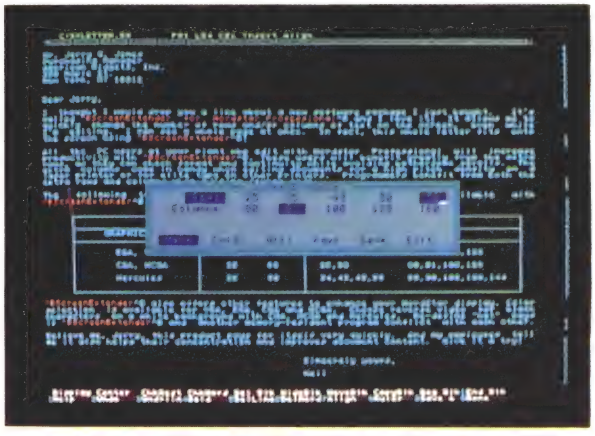
Screen Extender uses compressed sans serif type to fit more text on screen, with your graphics adapter determining the actual number of rows and columns. CGA and MCGA adapters provide 25 or 33 rows, with 80, 91, 106, 128, or 160 columns; EGA and VGA cards offer 35, 43, 50, or 58 rows, with the same column combinations; Hercules-mode options include 34, 43, 49, or 58 rows, with 80, 90, 102, 120, 144, or 180 columns.

Column and row combinations can be mixed at will. In addition to accommodating longer documents, the extra columns may come in handy for creating and viewing tables or programming longer lines of code without horizontal scrolling.

All *WordStar* features remain fully functional when *Screen Extender* is running, regardless of the number of columns and rows selected. Screen color remains unchanged, but paging or scrolling up or down takes two to three times as long. You can speed updates on EGA or VGA monitors by switching off full color and using only foreground and background colors.

The swap hot key lets you toggle between colors and between extended and normal modes. You can change row and column defaults at any time during editing by hitting the menu hot key for a pop-up menu and even redefine the hot keys so they don't clash with other memory-resident programs.

You can remove *Screen Extender* from memory after exiting *WordStar*. But once you've patched *WordStar* (by running WSCHANGE), you must activate *Screen Extender*



You can see more of your WordStar Professional 4.0 text with Screen Extender, a memory-resident program that can compress on-screen type into 58 rows and 180 columns.

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before running the word processor. Both operations are easily accomplished with the simple batch file provided.

The $59.95 add-on uses 48K of memory for CGA or MCGA, 68K for EGA or VGA, and 64K for Hercules adapters. *Screen Extender* requires DOS 2.00 or a later version, a graphics adapter, and *WordStar Professional 4.0*. It does not support earlier versions. Stairway Software Inc., 700 Harris St. #204, Charlottesville, VA 22901; 800/782-4792 for orders, 804/977-7770.

Back to Basics: Professional

Accounting Homework

While home-based businesses are often referred to as cottage industries, there's nothing quaint about what goes on there. In this country, the ranks of work-at-home entrepreneurs are growing by about 400,000 a year.

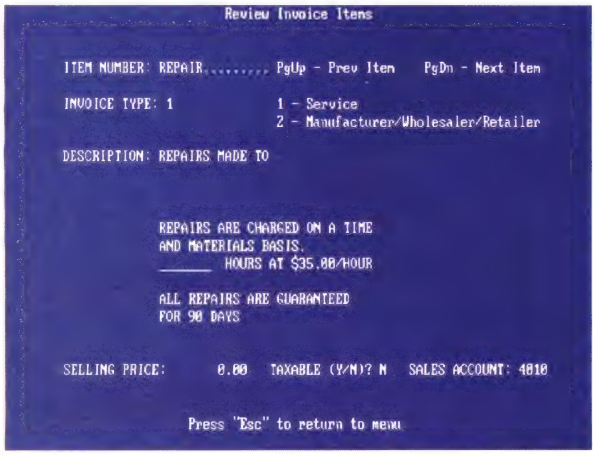
If your office is also your home, you need a strong but straightforward way to track what's coming in and going out. Peachtree's *Back to Basics: Professional* takes your accounting system out of the shoe box and puts it on the computer.

Aimed at those whose number-crunching prowess tops out with their monthly bank statements, *Back to Basics: Professional* takes the double-talk and double jeopardy out of double-entry accounting. The $199 program protects you from error by requiring that all entries balance before they're recorded. The accounts payable module provides an uncomplicated way to track your debts. Even better, the accounts receivable module streamlines tracking what you're owed.

Transactions from both modules automatically post to the program's general ledger, which computes balances from all transactions and prints useful financial reports such as your income statement and balance sheet.

Finally, the invoicing module lets you choose between free-form and predefined descriptions of services rendered or goods sold and will compare customer purchases with their credit limits. This module includes formats for service companies, manufacturers/wholesalers, and retailers.

Back to Basics: Professional requires DOS 2.00 or a later version and 128K of memory. Peachtree Software, 4355 Shackleford Rd., Norcross, GA 30093; 404/564-5700.



Back to Basics: Professional gives small businesses a variety of invoicing options.

BRIEFLY NOTED

V-RAM VGA

Video-7 has introduced the first graphics board based on video random access memory (VRAM), the speedier substitute for dynamic RAM (DRAM). Video-7 claims that its V-RAM Video Graphics Array (VGA), which is based on the company's proprietary VGA chip, processes graphics ten times faster than IBM's Graphics Display Adapter.

VRAM chips achieve this speed increase by having two "doors" through which information can pass, as opposed to the single door of conventional DRAM. V-RAM VGA reduces bottlenecks sometimes caused by standard DRAM chips running graphics-based software, bringing the fast response of text-based applications to such graphics-oriented jobs as desktop publishing and computer-aided design (CAD).

The board generally supports higher resolutions with more simultaneous colors than standard VGA cards. With 256K worth of video RAM memory, the V-RAM VGA board offers 4 colors at 1024 by 768 pixels, 16 colors at 800 by 600, and 256 colors at 640 by 400. Add another 256K of VRAM, and the number of colors rises to 16 at 1024 by 768, 256 colors at 720 by 540, and 256 colors at 640 by 480. V-RAM VGA comes bundled with software drivers supporting Microsoft's *Windows* and *Windows/386* and Autodesk's *AutoCAD* and *AutoShade* applications at resolutions up to and including 1024 by 768.

The $799 board will fit a PC XT-compatible 8-bit or an AT-compatible 8/16-bit slot, though its performance is superior when installed in the latter. For those willing to sacrifice a little speed for dollar savings, Video-7 offers Fast-Write VGA, a DRAM-equipped version that includes the custom VGA chip and the software drivers but is priced at $549. Video-7, 46335 Landing Pkwy., Fremont CA 94538; 415/656-7800.

Smartmodem 9600

Hayes Microcomputer Products has made its first foray into the mainframe communications market with the Smartmodem 9600, a full-duplex

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PW 1088

device built around the CCITT V.32 protocol. Designed for data transfer between local area networks and mainframes, the synchronous/asynchronous modem permits the high-speed data blasts required for communications with large computer systems.

While it is designed for high-integrity leased-line data transfer, the Smartmodem 9600 will automatically access a dial-up line should the leased line fail, falling back to the leased line when it becomes available again. This eliminates the expense of maintaining an extra dedicated leased line. The modem relies on mainframe protocols such as HDLC for its error correction. Version 2.0, due out later this year, will also support the range of lower speeds used more in the international market.

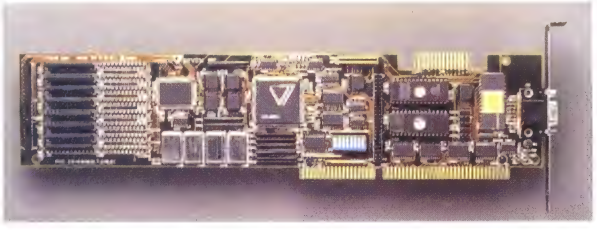
An industrial strength data gateway, the Smartmodem 9600 should not be confused with Hayes's V-series Smartmodem 9600, which is intended strictly as a PC modem. A half-duplex, asynchronous modem, the V-series isn't built to handle the large bursts of data required by the mainframe world. Version 1.0 of the Smartmodem 9600 is priced at $1999. Hayes Microcomputer Products, Inc., 705 Westech Dr., Norcross, GA 30092; 404/449-8791.

The Smartmodem 9600 is your communications gateway to distant LANs, mainframes, and cluster controllers. The synchronous/asynchronous modem is capable of the high-speed data blasts required for mainframe communications.

R:base for DOS Runtime

Microrim has introduced a full-fledged compiler for its relational data base management program, enabling developers to distribute cheaper, faster, and unalterable applications in the *R:base* procedural language. A single *R:base for DOS Runtime* license lets five users run any application written in the current or previous versions of *R:base for DOS* without needing individual copies of the data base program. The *R:base for DOS* procedural language itself ships with a pseudocompiler that still requires each user to have the program.

R:base for DOS Runtime is the first true compiler for Microrim's popular data base language. Such third-party compilers have vastly expanded the market for Ashton-Tate's *dBASE* language. Users of *R:base for DOS Runtime* have access to other *R:base* programs, custom mathematical expressions and routines, and SQL commands, but not to commands that create or modify the application's data base structure. *R:base for DOS Runtime*, which requires DOS version 2.00 or later, retails for $250. Microrim, 3925 159th Ave. NE, Redmond, WA 98052; 206/885-2000.



Video-7 claims that its V-RAM VGA board can process graphics ten times faster than IBM's Graphics Display Adapter by using video RAM.

AMI 386 AT Mark 2 Motherboard

American Megatrends has introduced a motherboard upgrade for ATs that could easily be considered the Cadillac of replacement boards. Equipped with a 25-MHz 80386 processor, the 386 AT Mark 2 Motherboard is rigged out with all the options.

In addition to its top-of-the-line processor, the AT Mark 2 achieves near-zero-wait-state performance through the use of a 64K memory cache operating at a 75 to 85 percent hit rate, claims the company. A 32-bit ROM BIOS also boosts speed. Graphics processing gets its own turbocharge through "video BIOS shadow RAM"—which exploits motherboard memory speed by using video routines stored in 32-bit memory rather than retrieving them from ROM in 8-bit chunks.

The motherboard also accommodates both the Intel 80387 and Weitek 3167 coprocessors, making a Mark 2–equipped AT ideal for CAD, desktop publishing, and other calculation-intensive applications such as sorting large data bases and recalculating large spreadsheets.

And the AT Mark 2 is as flexible as it is fast. You can add up to 4MB of DRAM chips and up to 4MB of SIMMs (single in-line memory modules) directly to the motherboard. DRAM is added in 256K increments; SIMMs, in 1MB increments. And if that's still not enough, the board's proprietary 32-bit memory slot will accept another 16MB.

The AMI BIOS, for which the company is best

Case History#60302

"With branches in North America, England, Switzerland, Australia, New Zealand, and Hong Kong, we needed a database solution that could run on a world of different PCs, LANs and minicomputers," said Eva Nohra of Drake International, one of the world's most successful personnel service agencies. "We chose DataFlex for all our in-house programming because it gave us this needed capability while providing a standard interface that looks and performs the same on a stand alone PC as it does on a LAN or MicroVAX."

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known, handles all system setup and advanced diagnostics. The AMI 386 AT Mark 2 comes with a 25-MHz processor and 1MB of memory for $2800. A 20-MHz version is also available for $2100. For XT owners there's a 20-MHz 386 XT Mark 2 replacement motherboard for $2000. American Megatrends, Inc., 4025 Pleasantdale Rd. #350, Atlanta, GA 30340; 404/263-8181.

Hummingbird Browser

Cauldron, headed by Charles Chou, the author of Ashton-Tate's *dBASE* compiler, has unveiled the first in a series of products aimed at making that popular but cumbersome data base easier to use. *Hummingbird Browser*, a RAM-resident program, has a cut-and-paste feature that lets you drop into a *dBASE III Plus* file, pluck out data, and deposit it directly into word processing documents or spreadsheets. This eliminates the time-consuming step of moving *dBASE* data to a newly created file before transferring it to another program.

To make cutting and pasting even easier, Cauldron has included macros that identify frequently addressed *dBASE* records and mark them for quick access and transfer. Users can cut and paste a single record or an entire window in one move. *Hummingbird Browser* also overrides regular *dBASE* commands to make adding and editing files simpler.

The $99 software comes packaged with two versions on the program disk. The first requires 180K of memory and takes advantage of all the software's functions. The second uses only 150K—enough to cut and paste, but not enough to edit *dBASE* files. Both versions require DOS 2.00 or a later version and at least 256K of memory. Cauldron, 3204 Adeline St., Berkeley, CA 94703; 415/654-3361.

ScanMan

Logitech has introduced a hand-held scanner for reading continuous-tone graphics, photographs, and text for desktop publishing and other applications. The company claims that ScanMan offers a 4-inch scanning window, compared to the 2½-inch window common among other hand-held devices. The device scans images up to 4 inches wide and 11 inches long at a resolution of 200 dpi.

Two scanning options are offered. Using WinScan, one of Logitech's bundled ScanWare utilities, you can scan a document or image directly into the *Microsoft Windows* clipboard. Non-*Windows* users can scan into a file with the Graphics Editor utility. Graphics Editor lets you size, cut and paste, color, reverse, rotate, flip, or magnify an image. ScanMan, which includes the scanner, interface card, and Logitech software, retails for $299. Logitech, 6505 Kaiser Dr., Fremont, CA 94555; 415/795-8500.

Forget-Me-Not

Sterling Castle calls it time-release software. *Forget-Me-Not* is a terminate-and-stay-resident program that operates on the computer's clock, rather than on a keyboard interrupt, to activate pop-up reminders or execute computer programs unattended. In a network environment, *Forget-Me-Not* can send messages of varying lengths to either the originator or another user. Multiple messages can be stored and then delivered at a specific time, at regular intervals, or randomly. If you insist, a "snooze alarm" feature repeats messages a few minutes after the first transmission.

Forget-Me-Not messages can be created with the DOS text editor EDLIN, *WordPerfect*, or any ASCII text editor. Additionally, the package will deliver pop-up messages from the appointment calendar in Borland's *SideKick*. Messages longer than one line in the window automatically wrap to the next line, and the pop-up window is adjustable. You can program *Forget-Me-Not* to execute batch files unattended; for example, it can sort large data bases and print lengthy reports after hours or dial up other computers when telephone charges are low. On a network, it can handle periodic work-group bulletins, reminders of project milestones, and backup tasks.

Forget-Me-Not, which uses standard DOS calls for file access and batch processing, requires 64K of memory and DOS 2.00 or a later version. It retails for $79.95. Sterling Castle, 702 Washington St. #174, Marina del Rey, CA 90292; 800/722-7853, 800/323-6406 California, 213/306-3020.

UPDATE

PFS: First Publisher 2.0

PFS: First Publisher 2.0 provides enhanced file import from popular word processing packages, as well as the ability to import scanned images. In addition to ASCII files and files from Software Publishing word processors, version 2.0 lets you select *Microsoft Word*, *WordPerfect*, *Display-Write 3*, *MultiMate*, and *WordStar* documents from a menu. It also accepts graphics files from *PC Paintbrush* and Microsoft's *Windows Paint*.

Though intended as an entry-level publishing tool, the program incorporates many features of more sophisticated and expensive products. But *PFS: First Publisher 2.0* is best at producing docu-

No matter which of these modes you use,

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40-column EGA Text
40-column VGA Text
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80-column EGA Text
80-column VGA Text
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Both displays have a 14" CRT, versus the 12" industry standard. And both come with a built-in tilt/swivel base and are backed by a 2-year limited warranty—twice as long as most other brands.

At $229 for the 7BM749 paper-white monochrome and $649 for the 9CM082 color display, Magnavox makes VGA displays affordable.

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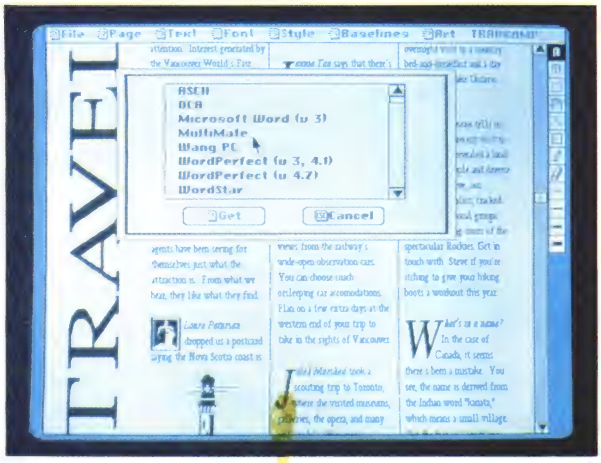

The entry-level PFS: First Publisher 2.0 imports scanned images and files from popular word processing packages.

ments like newsletters, flyers, attention-getting memos, announcements, and invitations.

This latest edition of *First Publisher* imports text, manipulates images, and prints twice as fast as version 1.0; it provides on-line help and will resize, invert, or flip images, or rotate them 90 degrees. With its new speed keys, users familiar with the program can bypass menus. The package also comes with 14 templates offering preconfigured page layouts. Documents can be formatted in one-to-four-column layouts of equal or varying lengths, but graphics and text are not restricted to those column borders. In the magnify mode, you can more easily edit the details of graphic images.

PFS: First Publisher 2.0 outputs to more than 70 dot matrix, laser, and ink jet printers, and it supports all Hewlett-Packard LaserJet and Bitstream soft fonts. The latest version ships with 150 clip-art images and a selection of 60 fonts; more are available in two font and seven clip-art portfolios for $39 each. The $129 program requires 512K of memory and DOS 2.00 or a later version. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94039; 415/962-8910.

Norton Commander 2.0

The new version of the *Norton Commander* DOS shell and file management program features the ability to open and browse all versions of *1-2-3*, *Symphony*, and *dBASE* files. These files can be viewed from the directory with a single keystroke, while word processing files can be seen with *Commander*'s scrollable text viewer.

Commander's pull-down menu interface responds to mouse or keyboard commands and organizes program functions into logical groups. Using the menu bar, you can select one or two directory panels and sort them alphabetically by name, size, date, or extension, or show the unsorted DOS order. You also can select multifile operations from directory panels. *Norton Commander* will show you a tree directory of the entire hard disk in one or both directory panels or pop it up in a window. Also available is a pop-up listing of the last 15 DOS commands you've executed.

The File Find feature lets you search an entire hard disk across all directories for a specific file or set of files (such as all files with a certain extension) in a full-screen, scrollable window. These functions also are accessible via the DOS command line.

Norton Commander, which requires DOS 2.00 or a later version and only 13K of memory, retails for $89. Upgrades are available for $33 for version 1.0 users. Peter Norton Computing, 2210 Wilshire Blvd. #186, Santa Monica, CA 90403-5784; 213/453-2361.

DacEasy Accounting 3.0, Payroll 3.0, Graph + Mate 3.0

Dac Software has upgraded its accounting suite. *DacEasy Accounting 3.0* has easier-to-use pulldown menus designed to handle accounting in the way you work—following a transactional flow rather than tying you to a module orientation. The new version also gives users the ability to add customers, vendors, accounts, products, or services while invoicing, entering purchase orders, and performing transactional entry routines. Also included are enhanced export facilities, new password protection, flat-rate billing, and more financial form options.

Dac Software has also added the new interface to the packages that complement its accounting flagship. *DacEasy Payroll 3.0* offers a revamped employee-file design that accommodates new fields, a new report format, and improved procedures for dealing with temporary employees.

Dac also has introduced *DacEasy Graph + Mate 3.0*, a RAM-resident utility for the accounting and payroll modules. It provides graphing and custom report generation and lets you select ways to view files. Moreover, this module incorporates a notepad, a calculator with a pasting capability, the ability to print to screen, and automatic backup and restore without the need to exit *DacEasy Accounting* or *Payroll*.

All three Dac packages require DOS 2.00 or a later version. *DacEasy Graph + Mate 3.0* requires 512K of memory. Each program retails for $99.95, or $35 for current users. Dac Software, 17950 Preston Rd. #800, Dallas, TX 75244; 214/248-0205.

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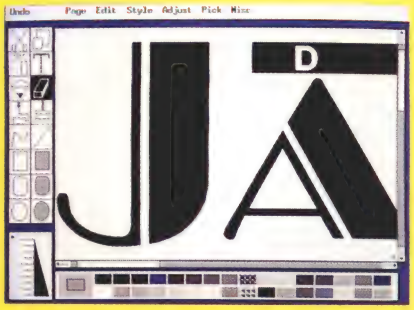
The *art* of desktop publishing



This masthead was created using the fonts and typographic features of Publisher's Paintbrush.

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Turbo Prolog 2.0

Borland International has bolstered its fifth-generation language with external data base support and an interpreter. Turbo Prolog 2.0 carries a complete set of tools for developing and maintaining large data bases and adds extensive graphics support. Turbo Prolog's ability to perform data base functions using one-tenth the amount of procedural-language code makes it ideal for designing customized knowledge bases, expert systems, and natural language interfaces.

The program's interpreter comes with source code and can be built into applications that require user programming capabilities. Program output can be directed to user-created windows on the screen. A Turbo Prolog Toolbox with 80 tools and more than 8000 lines of source code is available separately for $99.95. Turbo Prolog 2.0 requires DOS 2.00 or a later version and 384K of memory. It sells for $149.95, and registered users can upgrade from previous versions for free. Borland Int'l, 1800 Green Hills Rd., Scotts Valley, CA 95066; 408/438-8400.

Tree86 2.0

Version 2.0 of *Tree86* speeds backup operations by letting you copy a drive's directory structures onto a second drive, quickly identify unbacked-up files, and copy entire directories between drives without changing the logged drive or delving into DOS commands. A DOS shell and file management utility, *Tree86* provides a tree-like directory view with pulldown menus and dialog boxes. Together with its built-in mouse support, these provide point-and-shoot capability. *Tree86 2.0* also supports both 43-column EGA and 50-column VGA modes; a single keystroke lets you toggle between those and a 25-line mode.

Other enhancements include a menu-driven configuration program, the ability to use up to four specifications for global file searches, a variety of file-sorting criteria, and enhanced mouse support. *Tree86* reports on disk and system memory, lets you hide subdirectories, and runs programs from its environment. The $89 program requires DOS 2.00 or a later version and 128K of memory, but it automatically pares itself down to a 70K kernel when inactive. The Aldridge Co., 2500 City West Blvd. #575, Houston, TX 77042; 713/953-1940.

Version 2.0 of Tree86 enables you to create subdirectories on and back up files to a drive other than the one you are logged onto.

10Net Plus

10Net Communications has introduced a new version of its distributed local area network. The NETBIOS-compatible *10Net Plus* features *The Network Courier* electronic mail package, a windowed Chat feature for user-to-user communications and network management, and a menu-driven installation routine. *10Net Plus* supports the Server Message Block (SMB) protocols used in IBM's PC Network Program and OS/2 LAN Server, Microsoft's OS/2 LAN Manager, and Microsoft Networks. Its distributed architecture lets you share resources with and retrieve files from any node on the network, while disk caching minimizes I/O and reduces network traffic.

10Net Plus ships with a 10Net interface card tap box, cabling, software, and documentation. It requires DOS 3.00 or a later version and 192K of memory per node. The twisted-pair AT bus/starlan version and the Micro Channel Architecture version for IBM PS/2s each sells for $695 per node. The fiber optic version retails for $895. 10Net Communications, 7016 Corporate Way, Dayton, OH 45459; 513/433-2238.

XtreeNet

Executive Systems has released a network version of its *XtreePro* disk management utility. *XtreeNet* includes all of the file-locate, copy, move, and delete features of the single-user utility as well as several features tailored to the needs of network users. Under Novell's password scheme, *XtreeNet*, which supports Novell *Advanced Netware* versions 2.0 and higher and *286 ELS*, will display only those files and directories to which the user has access. Able to log on to multiple drives and handle up to 16,000 files, the package helps organize the network to avoid duplicate files and speeds installation of directories and copying of files to the server. With *XtreeNet*, network supervisors can configure and customize each user's file access as well as all files and directories on the system. Its retail price of $295 covers access by six users on a single file server. Executive Systems, 4330 Santa Fe Rd., San Luis Obispo, CA 93401; 805/541-0604. ●

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Circle 144 on reader service card

The Dell System 220. Once again the critics stole the words right out of our mouth.

"The Dell System 220 runs most PC Labs system benchmark tests at speeds that would make you think you're running a 386."

—PC MAGAZINE

"...the Dell machine is renewed evidence that the price of 286-based desktop equipment continues to drop rapidly, making such machines very attractive for daily work under MS-DOS even as they hold out the promise of running OS/2 in the future."

—WILL FASTIE, PC WEEK

"...includes a year's on-site support...in the price of the computer. This is the sweetest support deal offered by any computer vendor in the industry."

—ERIC KNORR, PC WORLD

"The hot item from a technical point of view is the System 220. This machine runs a 286 processor at 20 MHz, which is its major claim to fame."

—WILL FASTIE, PC WEEK

"...the System 220 has more going for it than just speed."

—PC WORLD

The reviews are beginning to pour in.

And they read like a wish list for every power user looking to exceed the ordinary limitations of a 286 computer.

The computer everyone is praising in such glowing terms is the Dell System 220.

The first 286 computer with a clock speed of 20 MHz.

It's totally MS-DOS® and MS® OS/2 compatible. Yet it sells for much less than you may pay for a 386† computer.

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THE NEW 20 MHz 386† SYSTEM 310.

The top of the line. It's our highest performance computer available, faster than the IBM† PS/2† Model 80 and the Compaq† 386/20. It runs at 20 MHz with the latest 32-bit architecture. Since it also has Intel's Advanced 82385 Cache Memory Controller, and high performance disk drives, the System 310 is ideal for intensive database management, complex spreadsheet development, CAD/CAM, desktop publishing or performance as a network file server.

Standard Features:

- Intel† 80386 microprocessor running at 20 MHz.
- 1 MB of RAM (640K usable) expandable to 16 MB without using an expansion slot.
- Advanced Intel 82385 Memory Controller with 32 KB of high speed static RAM.
- Socket for 20 MHz 80387 or Weitek coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 expansion slots (6 available).

Performance Enhancements (Systems 310 and 220):

- 384 KB of dedicated RAM is used by portions of the system software for increased performance.

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System 310	With Monitor & Adapter	
Hard Disk Drives	VGA Mono	VGA Color Plus
40 MB – 28 ms	$4,099	$4,399
90 MB – 18 ms ESDI	$4,899	$5,199
150 MB – 18 ms ESDI	$5,399	$5,699
322 MB – 18 ms ESDI	$7,399	$7,699

THE NEW 20 MHz 286 SYSTEM 220.

As fast as most 386 computers, at less than half the price—more power for the money than any other system. An 80286 system that runs at 20 MHz, with less than one wait state. Completely compatible for both MS-DOS® and MS® OS/2 applications (it runs faster than IBM PS/2 Model 80), and with a remarkably small footprint, the System 220 is the ideal executive workstation.

Standard Features:

- 80286 microprocessor running at 20 MHz.
- 1 MB of RAM (640K usable) expandable to 16 MB (8 MB* on system board).
- Page mode interleaved memory.
- Integrated diskette and VGA video controller on system board.
- One 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- LIM 4.0 support for memory over 1 MB.
- Three full-sized AT† compatible expansion slots available.
- Socket for 80287 coprocessor.

Options:

- External 5.25" 1.2 MB diskette drive.
- 3.5" 1.44 MB diskette drive.
- Intel 80287 coprocessor.
- 1 MB RAM upgrade kit.

***Lease for as low as $85/Month.*

System 220	With Monitor		
	VGA Mono	VGA Color	VGA Color Plus
One Diskette Drive	$2,299	$2,499	$2,599
40 MB – 29 ms Hard Disk	$2,999	$3,199	$3,299
100 MB – 29 ms Hard Disk	$3,799	$3,999	$4,099

THE 12.5 MHz SYSTEM 200.

A great value in a full-featured AT compatible. An 80286 computer running at 12.5 MHz, this computer is completely MS-DOS and MS OS/2 compatible. The System 200 offers high speed drive options, industry standard compatible BIOS and on-site service. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decision, this machine might be the ideal choice for your office."

Standard Features:

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- 640 KB of RAM expandable to 16 MB (4.6 MB* on system board).
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200 watt power supply.
- Real-time clock.
- 6 expansion slots. (4 available with hard disk drive controller and video adaptor installed).
- Socket for 8 MHz 80287 coprocessor.

Options:

- 512 KB RAM upgrade kit.
- 8 MHz Intel 80287 coprocessor.

***Lease for as low as $78/Month.*

System 200	With Monitor & Adapter	
Hard Disk Drives	VGA Mono	VGA Color Plus
40 MB – 28 ms	$2,699	$2,999
90 MB – 18 ms ESDI	$3,499	$3,799
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PRINTER SYSTEM 300; $199.95.
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Draft quality at 144 cps.
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Circle 74 on reader service card

Compaq and IBM: Faster, Top to Bottom

PC World reviews four hot new PCs—two from Compaq and two from IBM.

Compaq gets the plaudits for new technology, while IBM adroitly fills the gaps in its PS/2 line.

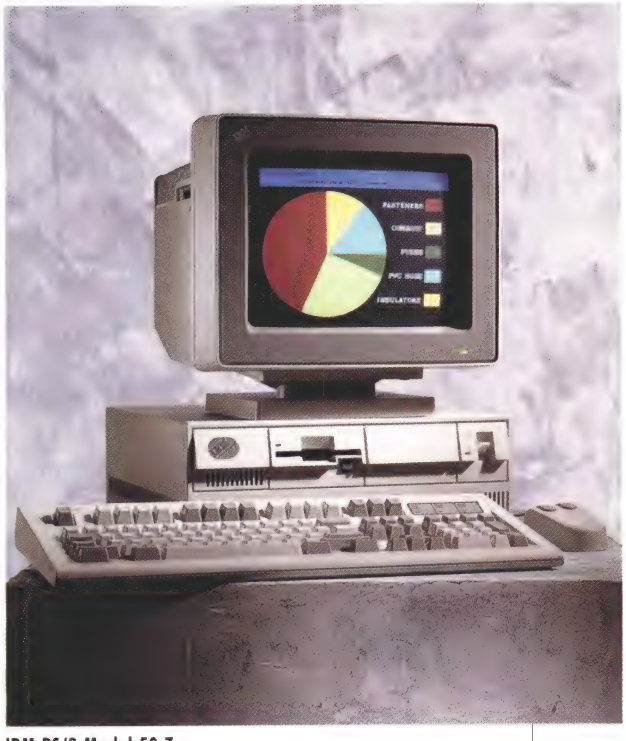
Eric Knorr

The past few months have been a heady time for PC shoppers. IBM finally decided there's no reason why all 80386 machines should sit under the desk, and introduced its first desktop 80386 machine, the PS/2 Model 70. The company also began shipping the PS/2 Model 50 Z, a zero-wait-state version of the original and still available Model 50 that offers hard disks larger than 20MB—a long-overdue improvement. Around the same time, Compaq launched the Deskpro 386/25, the first 25-MHz 80386 PC from a major vendor. Then Compaq threw a curve and inaugurated an entirely new class of machine with the Deskpro 386S.

Neither fish nor fowl, the small-footprint Deskpro 386S is the most intriguing of the four computers, because it's the first PC built around the new 16-MHz Intel 80386SX chip. One of the industry's worst-kept secrets, the 80386SX (also known as the P9) is a modified 80386 microprocessor designed to work in a low-cost, AT-like architecture instead of the standard 80386's architecture, which is still comparatively expensive to implement.

With a base price of $10,000—$6000 more than the Deskpro 386S—the fleet new Deskpro 386/25 seems designed to demonstrate how pricey an 80386 PC can get. Like the Deskpro 386/20, the 386/25 uses an Intel 82385 controller to manage a cache of very fast static RAM, enabling the CPU to run at zero wait states. At this writing, the Deskpro 386/25 is one of the fastest PCs around and is surely the first in its class to be available in large quantities.

At the high end of IBM's new 80386 desktop line is the 25-MHz PS/2 Model 70-A21, whose architecture closely resembles the Deskpro 386/25's; unfortunately, we were unable to procure a production unit in time for



IBM PS/2 Model 50 Z

Compaq Deskpro 386S

Compaq Deskpro 386/25

IBM PS/2 Model 70-121

PHOTOS BY JOHN GREENLEIGH

FEATURES EVALUATION

IBM and Compaq Systems Compared

The new boys on the block: Both the high and low ends get a boost from new IBM and Compaq contenders.

● Yes
○ No

	Deskpro 386/25	PS/2 Model 70-121	Deskpro 386S	PS/2 Model 50 Z
Standard features				
CPU	80386	80386	80386SX	80286
Clock speed	25 MHz	20 MHz	16 MHz	10 MHz
Built into motherboard				
Parallel port	0	1	1	1
Serial port	0	2	2	2
Floppy disk controller	○	●	●	●
Hard disk controller	○	●	●	●
Video adapter	○	●	●	●
Mouse port	○	●	●	●
Coprocessor support	80387, Weitek	80387	80387SX	80287
Memory capacity				
Amount shipped with unit	1MB	2MB	1MB	1MB
Maximum installable on motherboard	16MB	6MB	13MB	1MB
Expandability				
8/16-bit expansion slots/number free	5/3	1/1	4/4	3/3
8-bit expansion slots/number free	2/2	0	0	0
32-bit expansion slots/number free	1[1]/0	2/2	0	0
Half-/full-height storage device bays [2]	1/2	3/0	4[3]/0	3/0
120MB or larger hard disk available from maker	●	●	○	○
Ergonomic design				
Front-panel reset button	○	○	○	○
Front-panel on/off switch	○	●	●	●
Front-panel keyboard socket	●	○	○	○
ROM-based setup software	○	○	○	○
Tilt-and-swivel monitor	●	●	●	●
Compact footprint	○	●	●	●
Complete documentation	●	●	●	●

[1] Dedicated for memory.
[2] The Deskpros can use either 5¼-inch or 3½-inch devices; the PS/2s, 3½-inch only.
[3] Two bays handle only third-height devices.

review. What we did get from IBM was a customer-ready Model 70-121, a 20-MHz entry that uses a memory-paging scheme similar to that in the 20-MHz Model 80 (see *The Hardware Shelf, PCW,* August 1988). Interestingly, benchmarks conducted by National Software Testing Laboratories (NSTL) revealed that the Deskpro 386/25 offers a greater speed advantage over the Model 70-121 than the 25 percent higher clock rate would suggest.

Amid all this thundering new technology, the Model 50 Z upgrade seems but a whisper. Nonetheless, many users who fell for the original Model 50's cute footprint, snazzy graphics, and Micro Channel mystique—but balked at the sole 20MB hard disk option—will welcome the new 30MB and 60MB flavors. In addition, the machine's zero-wait-state operation boosts the speed of memory-intensive tasks by as much as 25 percent.

Four machines from the industry's two biggest PC manufacturers seemed a perfect challenge for our new compatibility benchmark, the NSTL Crash Test (see last month's *Hardware Shelf* for a full description). Of the four PCs, two exhibited compatibility problems. On the Deskpro 386/25, *SideKick* wouldn't unload, and timing problems prevented *Crosstalk XVI* from completing its setup routine or dialing out; all these difficulties can be overcome by switching the clock rate to a slower speed. With the Model 50 Z, *Smartcom II* could not initialize or reset the modem, and the COM1 port did not respond to *Smartcom II* commands.

In addition to the compatibility tests, NSTL ran its usual five-part set of DOS speed benchmarks, along with a brand-new seven-part OS/2 performance suite (see "Is Your PC Ready for OS/2?" in this issue for the results of NSTL's OS/2 opus). Three of the OS/2 benchmarks were multitasking tests built on a best guess of how tomorrow's user will handle multiple applications. We think you'll find the results instructive, provocative, and particularly useful for making long-term PC buying decisions.

The Compaq 386S Versus the 80286 Hordes

In terms of price and functionality, the 16-MHz Deskpro 386S falls squarely between the 12-MHz Deskpro 286 and the 16-MHz Deskpro 386. Like an 80386, the Deskpro 386S's 80386SX CPU can run 80386-specific software such as *Windows/386* or *Paradox/386*. But like any AT compatible, the Deskpro 386S moves data along a 16-bit path rather than a 32-bit path and uses a 24-bit address path, limiting memory to 16MB.

CPU aside, the diminutive Deskpro 386S is unlike any other PC that Compaq has produced. Know thy enemy, the saying goes; Micro Channel excepted, the Deskpro 386S's design is very similar to that of the PS/2 Model 50. The machines' footprints are nearly identical. And although you can't pull the *whole* 386S apart without tools like you can a Model 50, the cover is held on by thumbscrews, just as on a PS/2 unit.

More important, as with the Model 50, the hard/floppy disk controller is built into the motherboard. A VGA, a mouse port, and one parallel and one serial port are also integrated, with corresponding connectors in exactly the same locations on the Model 50. Even the front-mounted power switch is in the same place. Now *that's* learning from the competition.

EXECUTIVE SUMMARY

PS/2 Model 70-121

20-MHz 80386 computer

Essentially a Model 80-111 in a Model 50 chassis, the Model 70's performance is not outstanding for its class. A fairly low ceiling on memory and mass storage expansion makes the unit a workstation rather than a server-class machine.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity		●		
Expandability		●		
Ergonomic design				●
Performance			●	
Overall value			●	

Compaq claims that unless you run one of the handful of programs that use 32-bit instructions, the Deskpro 386S—with its half-width data path—should match the performance of comparable 80386 machines. NSTL's speed tests reveal that when compared with the original 16-MHz Deskpro 386, the Deskpro 386S actually runs about 91 percent as fast as its ancestor in both the DOS and OS/2 benchmarks.

EXECUTIVE SUMMARY

PS/2 Model 50 Z

10-MHz 80286 computer

At last, IBM expands the Model 50's mass storage beyond 20MB! In addition to offering new 30MB (Model 50-031) and 60MB (Model 50-061) drive options, the 50 Z pushes memory access to 10 MHz, zero wait states—a 25 percent increase in memory access speed.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity		●		
Expandability		●		
Ergonomic design				●
Performance			●	
Overall value			●	

Clearly, the main advantage of the Deskpro 386S (or any 80386SX machine) over an 80386 PC is lower price. In addition to meshing with a less costly architecture, the 80386SX chip is about 30 percent cheaper than an 80386 chip, and these savings are clearly reflected in Compaq's pricing structure. A Deskpro 386S with 1MB of RAM, a 1.2MB floppy drive, a 40MB hard disk, a VGA monitor, and a 101-key keyboard costs $5898; an identically configured 16-MHz Deskpro 386 goes for $1500 more.

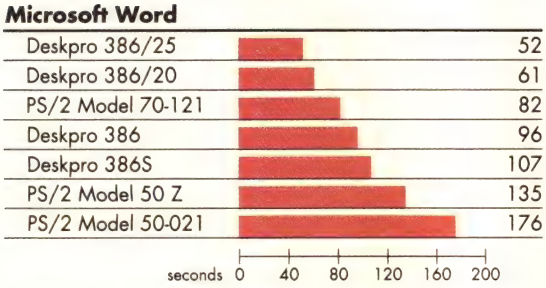
But what about comparable 80286 machines? Both types of computers offer a 16-bit data path, and Compaq's own 12-MHz Deskpro 286 is $1000 cheaper than the 386S. More to the point, Dell's System 220, which

NSTL TEST REPORT

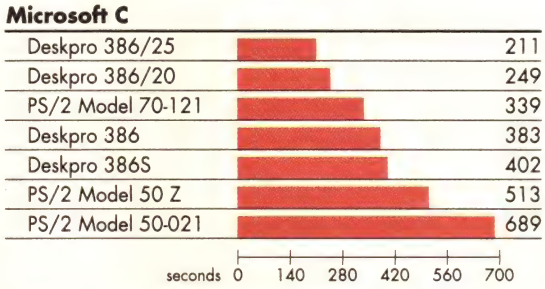
Compaq and IBM Systems

The four latest, greatest PCs tested—the Deskpro 386/25, the Deskpro 386S, the PS/2 Model 50 Z, and the PS/2 Model 70-121—represent four distinct classes of machines.

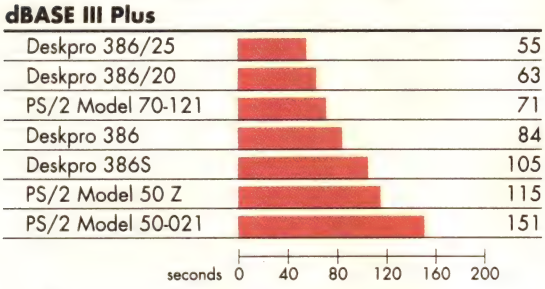
Microsoft Word



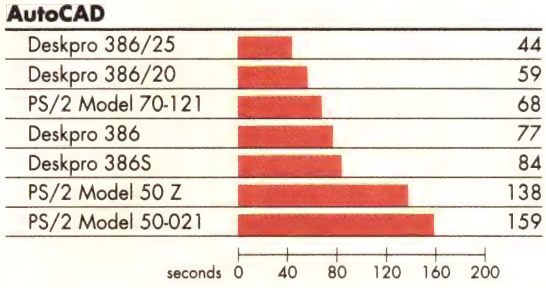
Microsoft C



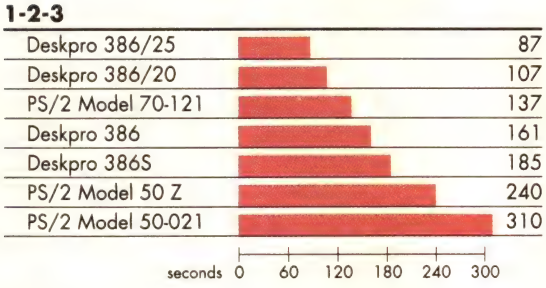
dBASE III Plus



AutoCAD



1-2-3



All machines were tested with a coprocessor and a disk cache consisting of 256K of extended memory, except for the *1-2-3* benchmark. The Compaq Deskpro 386/25 was tested with a 300MB hard disk and 3MB of RAM. The Deskpro 386/20 was tested with a 135MB hard disk and 5MB of RAM. The IBM PS/2 Model 70-121 was tested with a 120MB hard disk and 3MB of RAM. The Deskpro 386 was tested with a 43MB hard disk and 4MB of RAM. The Deskpro 386S was tested with a 40MB hard disk and 1MB of RAM. The PS/2 Model 50 Z was tested with a 30MB hard disk and 1MB of RAM. The PS/2 Model 50 was tested with a 20MB hard disk and 1MB of RAM.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no screen access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The Microsoft C benchmark measures the time required to compile and link XLISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

uses a 20-MHz 80286, outperforms even the 16-MHz Deskpro 386 and beats the 386S's price by a cool $2600 (see *The Hardware Shelf* in this issue for a review of the System 220). Aside from their ability to run 80386-specific software, will 80386SX machines offer any advantage over 80286 PCs with the same clock rate?

The answer is a heavily qualified yes. Many experts believe that 80386SX chips are more reliable than 80286s pushed to 16 MHz and over; others contend that, clock rates being equal, 80386SXs have a slight performance edge when running today's 16-bit OS/2. Unfortunately, not enough testing has been done to confirm either hypothesis decisively.

When you get down to it, the real benefit of the 80386SX is, yes, 80386-specific software. A 32-bit version of OS/2 will probably surface by 1990. Even if OS/2 leaves you cold, multitasking contenders like *Windows/386* and *Desqview/386* provide viable alternatives bound to grow more useful and popular.

In the unlikely event that you plan on running DOS through the end of the century, however, the PS/2 Model 50 Z might be a better bet. It's only 25 percent slower than the 386S but includes a video setup and, like the Deskpro 286, is about $1000 cheaper. And thanks to no-wait-state operation, the 10-MHz Model 50 Z enjoys about a 10 percent performance edge over the comparably priced 12-MHz Deskpro.

Deskpros 286 and 386S trounce all desktop PS/2s in one area, however: expandability. Like any AT clone, the Deskpro 286 offers two 8-bit and six 8/16-bit slots; with a floppy/hard drive controller and a video board, that leaves a capacious six slots open.

But the Deskpro 286 is a passé desk hog. The real marvel is the Model 50–size Deskpro 386S, which leaves four 8/16-bit AT-compatible slots free for the taking, as opposed to the Model 50 Z's three 16-bit Micro Channel slots. In addition to having space for one 3½-inch hard disk, the Deskpro 386S can accommodate one half-height and two third-height 5¼-inch devices, all of which are externally accessible. Contrast this with the Model 50 Z's support for three half-height 3½-inch devices total, only two of which you can get to from the outside.

If you're concerned about the future and don't want to shell out for a full-fledged 80386 PC, compatibility with upcoming 32-bit software provides a strong argument for buying a Deskpro 386S. The machine's paradoxical combination of expandability and small footprint is also a strong draw.

On the other hand, if you think an 80286 PC can fill your needs and you don't anticipate much expansion, the Model 50 Z is a good choice as a DOS machine. Its price is fairly competitive, its performance is first-rate for a 10-MHz unit, and IBM's ability to manufacture its own RAM chips should ensure that you won't be caught short. However, keep in mind that when the future

EXECUTIVE SUMMARY

Deskpro 386/25

25-MHz 80386 computer

One blazing PC, the Deskpro 386/25 uses the same high-performance caching architecture as the 386/20. An AT-class array of expansion slots, room for plenty of RAM, and high-capacity ESDI drive options make this machine an excellent choice as a server.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity				●
Expandability				●
Ergonomic design		●		
Performance				●
Overall value			●	

NSTL BENCHMARK TESTING

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL),** is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, **NSTL** believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. **NSTL** testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. **NSTL** publishes its test results in *Software Digest Ratings Report*® and *PC Digest.*™ Neither publication accepts advertising. **NSTL** is located in Philadelphia, Pennsylvania.

arrives, you may not be able to use your elegant little Model 50 Z for anything more than a network workstation.

The Clock Strikes Again

After introducing the Deskpro 386/25, Compaq loudly proclaimed that it was ahead in the performance race once again. That braggadocio may have been premature, because according to NSTL's preliminary benchmarks, IBM's 25-MHz Model 70-A21 appears to have a slight edge (see the preview of IBM's new systems in *PCW*'s August issue).

Whatever the ultimate outcome of the speed trials, one thing is certain: In the Model 70-A21, Compaq's choice of the 82385 cache controller has gotten an enthusiastic second from IBM. Ironically, the wisdom of this endorsement is illustrated by the 20-MHz Model 70-121.

At 25 MHz, some kind of cache memory scheme is a necessity, unless you want to spend an impractical amount of money for very fast system RAM. At 20 MHz, it's a judgment call. Rather than opt for an 82385-based memory-cache architecture as Compaq did with the Deskpro 386/20, IBM chose a page-memory scheme similar to that of the 20-MHz Model 80.

The upshot is that the Model 70-121 is up to 36 percent slower in the DOS tests and as much as 43 percent slower in the OS/2 tests than the Deskpro 386/20.

IBM may not have created a speed demon, but it has done an expert job of shoehorning an 80386 into a casing identical to that of the Model 50. Although the Model 70-121 offers only three expansion slots, it holds up to 6MB of RAM on the motherboard and, like the Model 50, integrates a hard/floppy disk controller, a VGA, a mouse port, and one parallel and one serial port into the motherboard.

Like all Micro Channel PS/2s, the Model 70 has a 16-bit slot with a special video extension for augmenting the built-in VGA with a higher resolution video board. The other two slots are 32 bit and can be used for either memory or yet-to-be-released 32-bit I/O boards. Storage device support is identical to that of the Model 50 Z.

Compared with the Model 70 or Compaq's own 386S, the Deskpro 386/25's classic Compaq cabinet is clunky and unattractive—but roomy. The motherboard offers five 8/16-bit AT-compatible and two 8-bit PC XT–compatible slots; with a VGA board and the floppy/hard disk controller, two of the 8/16-bit slots are unavailable. You can access both full-height device bays from the outside; either one can also accommodate two half-height drives.

In addition to a faster CPU and greater expandability than the Model 70, the 386/25 offers two more advantages: a larger capacity for 32-bit RAM and sockets for both the 25-MHz 80387 and the higher performance 25-MHz Weitek math coprocessors. In a special 32-bit slot, you can install a board that holds up to 16MB of 32-bit RAM. With the cache as an intermediary, this RAM can be accessed at the full speed of the CPU.

Beyond the Model 70-121's 6MB motherboard limit, you could conceivably add 20MB

EXECUTIVE SUMMARY

Deskpro 386S

16-MHz 80386SX computer

This machine represents a whole new class of PC. Using a scaled-down 80386 (called the 80386SX, or P9) in a 16-bit architecture, the 386S offers a PS/2-like shell and a price between that of the 12-MHz Deskpro 286 and the 16-MHz 386. The 386S's main advantage over 80286 PCs is its ability to run 80386-specific software.

	POOR	FAIR	GOOD	EXCELLENT
Memory capacity			●	
Expandability			●	
Ergonomic design				●
Performance			●	
Overall value			●	

of 32-bit RAM via expansion boards, but that memory would be accessed at the Micro Channel's 10-MHz expansion bus speed, not at the CPU's 20-MHz clip. Had the 70-121 used memory caching (which caches data from the expansion bus as well as the memory bus), RAM over 6MB would have also benefited from it.

The Model 70-121 and the 386/25 occupy different rungs on the price/performance ladder. With 2MB of RAM, a 1.2MB floppy drive, a 110MB hard disk, VGA graphics, and a 101-key keyboard, the 386/25 costs $11,952; the Model 70-121 (with a 120MB instead of a 110MB hard disk and a 1.44MB floppy drive) goes for $7995. The appropriate comparison is really with the Model 70-A21, which goes for $11,295 in the same configuration.

When the Model 70-A21 arrives, we'll see who's really the baddest on the block. (In the meantime, it's clear that Compaq's 82385-based 386/20 also bests the Model 70-121.) The Micro Channel may reveal hidden superiorities, but at this writing, it looks like memory-cached PCs with 20-MHz or faster 80386s are the preferred computing platforms for the future. ●

Eric Knorr is a senior editor for PC World.

WHERE TO BUY

Deskpro 386S
Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
800/231-0900, 713/370-0412 (customer support)
List price: Model 1 with 1MB RAM, 1.2MB floppy drive, built-in VGA, one parallel and two serial ports, 101-key keyboard $3799; Model 20 with 20MB hard disk $4499; Model 40 with 40MB hard disk $5199
Accessories: 1MB memory module $799, 4MB memory module $2999, 1MB memory expansion board $799, 4MB memory expansion board $2999; color VGA monitor $699, monochrome VGA monitor $255; 360K floppy drive $225, 1.2MB floppy drive $275, 1.44MB floppy drive $245; 20MB hard disk $999, 40MB hard disk $1549, 110MB hard disk $3499; 40MB tape backup $799, 135MB tape backup $1999; 16-MHz 80387SX math coprocessor $799; I/O board $149; MS-DOS 3.30 and BASIC 3.30 $120, MS-OS/2 1.00 $325
Warranty: one year
Extended warranty: available through dealers
Technical support: customer support line, no toll-free number, M–F 7–7
Other support services: none

Deskpro 386/25
Compaq Computer Corp.
List price: Model 110 with 1MB RAM, 1.2MB floppy drive, 110MB ESDI hard disk, one parallel and one serial port, 101-key keyboard $10,299; Model 300 with 300MB ESDI hard disk $13,299
Accessories: 1MB memory module $799, 4MB memory module $2999, 4MB system memory board $2999; color VGA monitor $699, monochrome VGA monitor $255; VGA board $599; 360K floppy drive $225, 1.2MB floppy drive $275, 1.44MB floppy drive $245; 110MB ESDI hard disk $3499, 300MB ESDI hard disk $6499; 40MB tape backup $799, 135MB tape backup $1999; 25-MHz 80387 math coprocessor $1899, 25-MHz Weitek 3167 math coprocessor $2599; I/O board $149; MS-DOS 3.30 and BASIC 3.30 $120, MS-OS/2 1.00 $325
Warranty: one year
Extended warranty: available through dealers
Technical support: customer support line, no toll-free number, M–F 7–7
Other support services: none

PS/2 Model 70-121
IBM
900 King St.
Rye Brook, NY 10573
800/447-4700
List price: with 2MB RAM, 1.44MB floppy drive, 120MB hard disk, built-in VGA, one parallel and two serial ports, 101-key keyboard $7995
Accessories: 2MB-to-8MB memory expansion option $1695; 1MB 85ns memory module kit $695, 2MB 85ns memory module kit $1395; IBM C/2 1.10 C compiler $560 (additional licenses $475 each)
Warranty: one year
Extended warranty: available through dealers

PS/2 Model 50 Z
IBM
List price: Model 50-031 with 1MB RAM, 1.44MB floppy drive, 30MB hard disk, built-in VGA, one parallel and two serial ports, 101-key keyboard $3995; Model 50-061 with 1MB RAM, 1.44MB floppy drive, 60MB hard disk, built-in VGA, one parallel and two serial ports, 101-key keyboard $4595
Accessories: unpopulated 8MB expanded memory adapter $600; 512K 120ns memory module kit $215, 2MB 120ns memory module kit $995, 2MB 85ns memory module kit $1395; IBM C/2 1.10 C compiler $560 (additional licenses $475 each)
Warranty: one year
Extended warranty: available through dealers
Technical support: available through dealers
Other support services: none

For more information, see Products Featured in This Issue.

Remote Assistance

Remote communications packages let you dial up a distant PC to access data, swap files, and run applications.

They're popular among MIS managers, tech support specialists, and anyone who needs to access the office PC from home or while on the road.

Judy Getts

Distance may lend enchantment, but it sure complicates computer projects. Consider these scenarios: An out-of-town client's software goes haywire the minute you get back to your office. The files in your company's Tampa branch need to be updated every night, but the information is generated in Dayton. Or maybe you'd just like to be able to call up your office PC on the weekend and fetch files or run a program from your home.

Thanks to a group of specialized communications packages, all these challenges can be met. Lumped under the *remote communications* rubric, *Carbon Copy Plus*, *Close-Up*, *Co/Session*, and *Co-Compute* share many features with general-purpose communications programs. But their special talent is accessing a remote PC's entire system, including DOS, and controlling it from a distance by modem. The host PC can run the remote PC's applications, fetch and send files, and even switch to DOS for housekeeping. If you've ever wanted to update information on a group of PCs in another city or troubleshoot a data base across the country, these long-distance assistants can be invaluable.

Remote Control

Most remote packages consist of two separate modules—a control program for the PC that runs the show, and a smaller, memory-resident complement that pops up over whatever application is running on the remote system. Video setups and processors needn't match, but the same brand of remote software must be running at each end.

Once connected by modem, the two PCs work in tandem: The screens at each end display the same images, the keyboards operate as one, and users at either end can work with the application at the same time. The main difference in running a program from afar is that applications feel molasses-slow. In some instances when you type a command, the remote package has to transmit a new screen image, and the delay can be quite noticeable.

Some of the programs use data compression to speed transmission of screen images, and some offer automatic error-correction of screen images and keystrokes. Some can take snapshots of the remote PC's screen, and log and replay a series of screens for later review. System security is usually limited to an access password or a requirement that

the remote PC call the host PC back before allowing access. You can't effectively cordon off selected subdirectories or files, much less maintain caller logs that track access.

Tested with *dBASE III Plus*, *Reflex*, *1-2-3*, *Microsoft Word*, *WordPerfect*, *VP-Planner*, *Xtree*, and *WordStar*, most of the packages ran well. Because the large amount of screen data involved in high-resolution graphics slows communications, three out of the four packages don't support EGA, so applications must be installed in CGA mode. (*Carbon Copy* is the sole EGA supporter.) Finally, the programs often clash with RAM-resident utilities; to be on the safe side, you should unload any TSRs before attempting a remote connection.

To be most useful for support or teaching, a good communications package puts the advisor in the driver's seat. If a remote user is rattling away at the keyboard and you need to take control, for example, you can usually blank the remote screen or freeze the remote keyboard. This may seem draconian, but anyone who regularly troubleshoots applications or trains less experienced users will find these measures necessary to prevent novices from jumping in at the wrong time. To help orchestrate the proceedings, users can exchange messages in a pop-up status screen/chat window (which freezes the application, except in *Co-Compute*) or switch their call from data to voice.

Close-Up 3.0A

Technical Support Favorite

Well-chosen features, a unique script language, and a polished interface have made *Close-Up* increasingly popular, especially among tech-support specialists. Norton-

TIM LEWIS

Lambert has signed long-term contracts for customer support with a number of major software vendors, including IBM, Borland, and Ashton-Tate.

In *Close-Up*, a 128K Support module runs on the advisor PC, while a 50K memory-resident Customer module runs on the remote PC. Either computer can call the other, and you can switch between voice and data with a single menu command. Optional password and auto-callback features control access to the remote PC, and the customer decides whether to allow the advisor to send files, fetch files, or do both. If detailed analysis is called for in troubleshooting a sputtering application, *Close-Up* can take screen snapshots or record the session for later playback.

Close-Up is the only package that includes a script language for automating remote sessions. The language is easy to learn, yet so-

FEATURES EVALUATION

Remote Communications Programs Compared

Carbon Copy Plus may have an edge in video support, but ease of use and a unique script language make Close-Up the top choice.

● Yes
○ No
◒ Deficient

	Carbon Copy Plus 5.0	Close-Up 3.0a	Co-Compute 2.1	Co/Session 3.0
Remote control features				
Accesses remote system's DOS	●	●	●	●
Disables remote PC's keyboard	●	●	●	●
Blanks remote PC's screen	●	●	○	○
Remote printing	●	●	○	●
Script language for automating remote sessions	○	●	○	○
Video modes supported				
HGC	●	○	○	○
CGA	●	●	●	●
EGA	●	○	◒[1]	○
MCGA	●	○	○	○
VGA	●	○	○	○
Terminal emulation	●	●	○	◒[2]
Data security/integrity				
Password protection	●	●	n/a	●
Automatic callback	●	●	n/a	●
Sets file-transfer access rights	○	●	○	●
Error-corrected keystrokes	●	●	●	○
Error-corrected screens	●	●	○	○
Error-corrected file transfers	●	●	●	●
Collaboration features				
Voice/data switching	●	●	●	●
Chat box	●	●	●	●
Real-time keystroke display	○	○	●	○
Captures remote screen	●	●	○	●
Records entire session	●	●	○	●
Logs time and activity	●	●	○	◒[3]

[1] In keystroke-sharing mode, not in terminal mode.
[2] TTY terminal only.
[3] Logs time only.

phisticated enough to rouse the program in the middle of the night to transfer and modify files on a whole series of different PCs. Finally, *Close-Up* emulates a host of terminals—including TTY, VT 100, and IBM 3227. You can access on-line services and other non-*Close-Up* systems, even dial up the office PC to access the company's minicomputer or mainframe. You can also transfer files in the background while running an application.

Close-Up worked seamlessly with all the test applications, including *Microsoft Word* in graphics mode. The package's screen painting and terminal features were none too speedy, but file transfers proved fast and reliable. Easy-to-use *Close-Up* is the top choice among the packages reviewed. Its unique script language makes it particularly useful for late-night, multiple remote sessions.

EXECUTIVE SUMMARY

Close-Up 3.0A

Remote communications program

BEST BUY

Close-Up is a polished product with a capable user interface and a unique script language to automate remote sessions. The program is easy to learn and use and contains an abundance of useful features.

	POOR	FAIR	GOOD	EXCELLENT
Remote control features				●
Data security and integrity			●	
Collaboration features			●	
Overall value				●

Carbon Copy Plus 5.0

Fast Graphics

If it weren't for *Close-Up*, *Carbon Copy Plus* would dominate the remote market. One of the first remote package released, *Carbon Copy Plus* now boasts EGA support, fast screen updates, expanded terminal emulation, and background file transfers. At $195 per module, however, *Carbon Copy Plus* is the most expensive package reviewed. Moreover, its interface isn't well organized, and its file transfer utility and documentation could stand improvement.

Carbon Copy Plus's 176K advisor and 62K remote modules are included in a single pack-

age but are copy protected by serial number, so you must buy a separate copy for each PC. File transfers are performed with a module called CCDOS, which lets users shuttle files between PCs with a COPY command and DOS-like syntax. Unfortunately, CCDOS proved clumsy to use and a tad erratic. It sometimes appeared to transfer files between PCs when in fact nothing was deposited on the target PC. When this happened, the program locked up and both PCs had to reboot.

Carbon Copy Plus ran all the programs tested except *Microsoft Word* in graphics mode and handled *1-2-3* graphs and charts impressively fast in EGA mode. The package's screen updates are remarkably quick—some 30 percent faster than *Close-Up*'s. Its facility with graphics and unrivaled speed make *Carbon Copy Plus* a solid choice, especially for support of applications in EGA mode.

EXECUTIVE SUMMARY

Carbon Copy Plus 5.0

Remote communications program

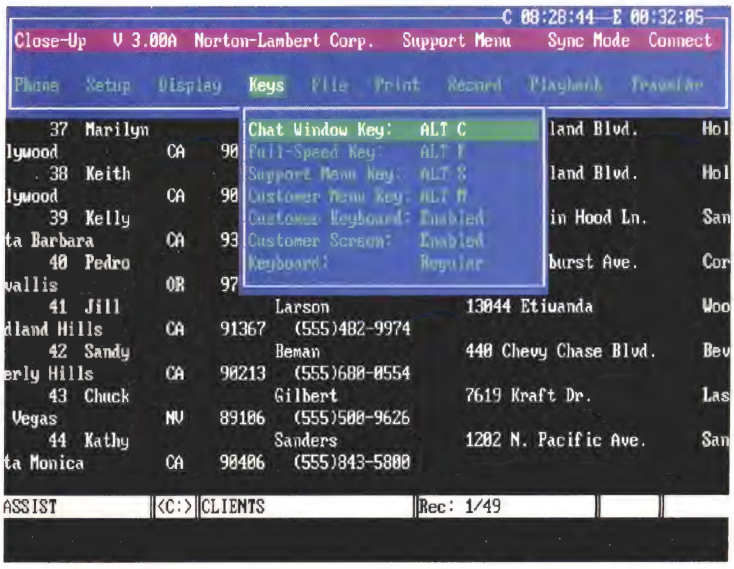
A market leader among support packages, *Carbon Copy Plus* deserves plaudits for its EGA support and speedy screen updates. But the program proved unreliable in transferring files.

	POOR	FAIR	GOOD	EXCELLENT
Remote control features			●	
Data security and integrity		●		
Collaboration features			●	
Overall value			●	

Co/Session 3.0

Awkward Design

The newest entry in the remote computing field, *Co/Session* has most of the features found in *Carbon Copy Plus* and *Close-Up* but implements them poorly. The hardest thing about using *Co/Session* is dealing with its labyrinth of menus. You have to fight through a jungle of menus to make a connection, then hack through an even denser menu thicket to transfer files to and from the remote PC.

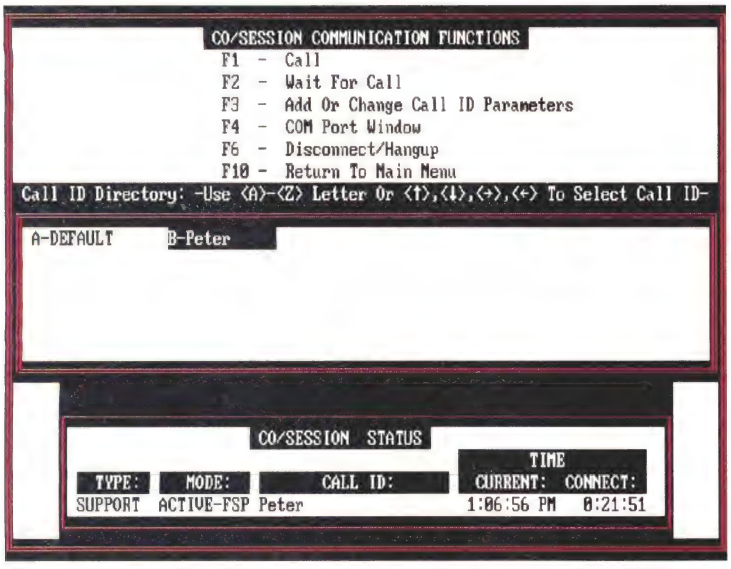


With Close-Up, the advisor can display either Support or Customer pulldown menus while on line with a customer's PC. Here, the Support menu is popped up over dBASE III Plus at the customer's end.

Like *Carbon Copy* and *Close-Up*, *Co/Session* offers a terminal mode, but it's a pale shadow of a TTY. When logging on to a remote system, *Co/Session* missed the first few lines of the connection screen. When capturing text, it omitted linefeeds unless instructed to include them, and it couldn't upload text in ASCII mode. And after you thrash through a series of menus to upload files using error checking, you return to find the terminal screen unexpectedly blank.

Some *Co/Session* features seem pointless. For example, when you switch from voice to data, the program demands a password. And a security feature designed to restrict file access by drive and directory works only while the remote user is manipulating files with *Co/Session*. Nothing prevents the user from skipping into DOS and accessing off-limits files.

Other design omissions are at least as annoying. It's too easy to accidentally hang up by pressing the wrong function key, and there is no prompt to confirm your intention to terminate. A billing log records the time, date, and elapsed time of a support call but not the operations performed. And when *Co/Session* was tested on a Tandy 1000, the keyboard's cursor pad wouldn't work.



Co/Session's Communications Function screen is hardly a model of clarity. Call profiles—containing settings, phone number, password, and so on—are listed in the center of the screen.

Co/Session worked well with most applications tested. Its screen painting was faster than average, though it took two slow sweeps of the screen to paint both a *1-2-3* bar graph and individual screens in *Reflex*. While in *Reflex*, *Co/Session* smeared part of a screen, then froze up both machines.

Co/Session has some good points. It's easy to skip between the remote PC and applications on your own PC, and using *Co/Session* can be fast once you get used to its quirks. But careless design makes the package an iffy choice.

Co-Compute 2.1

Collaborative Companion

If the other packages reviewed foster something of a master/slave arrangement, Harmony Software's *Co-Compute* is much more egalitarian. It's both a remote access program and a person-to-person conferencing tool. Unfortunately, a Spartan interface and lean features make using it relatively awkward.

Unlike the other packages, *Co-Compute* requires that two people establish a phone connection by voice and then switch over to data. In terminal/host mode, *Co-Compute* then runs much like its competitors. But in what Harmony calls Symmetric, or keystroke-sharing, mode, users run identical applications on each PC simultaneously. Harmony claims that running two applications on two PCs in parallel, rather than running a single application by remote control, means graphics-based programs like *Harvard Business Graphics* and *Ventura Publisher* can run at normal speed.

Co-Compute sessions all begin with a voice phone call, but conversation soon recedes to a tiny on-screen box that serves both as *Co-Compute*'s menu and chat box. You can expand the one-line box to the width of the screen, but sending notes still feels as cramped as peering through a keyhole. On the other hand, *Co-Compute*'s unique real-time keystroke display always lets you know exactly what your partner is doing. When the remote user presses <Cursor Up>, for example, an up arrow appears in the box on your screen. And unlike the other packages, *Co-Compute* lets you read and write notes on screen without suspending the application—a boon for backseat spreadsheet drivers.

Co-Compute could be an ingenious teaching device, but it's limited for remote communications. The program can't take screen snapshots, doesn't offer error correction for screen transmissions, and lacks even a simple hang-up command. At press time, Harmony was developing an unattended auto-answer feature, but the current version of *Co-Compute* doesn't let you call up your office PC from the road.

EXECUTIVE SUMMARY

Co/Session 3.0

Remote communications program

Co/Session suffers from flaky design and inadequate documentation. It's fast but weighted down by complex menus and features that never quite get off the ground.

	POOR	FAIR	GOOD	EXCELLENT
Remote control features			●	
Data security and integrity			●	
Collaboration features			●	
Overall value			●	

A Few Words of Advice

In the best of all worlds, a remote communications package would offer advisor/remote and collaborative modes, control over any program in any graphics mode, error-checked file transfers, and tamper-proof security features. While it isn't perfect, *Close-Up* comes closest to providing all these functions. *Carbon Copy* offers spiffy graphics support and exemplary speed, but it suffers from file transfer problems and quirky design. With its muddled menus and pointless features, *Co/Session* still has a ways to go. While *Co-Compute*'s collaborative orientation and keystroke viewing mode are appealing, the program's limitations make it a poor choice for general remote support.

Remote communications software is still evolving, and vendors seem to bring out new versions almost weekly. At press time, for example, *Crosstalk* had just released its $195 *Remote2* package—too late for review. And users will need patience and a willingness to fiddle to get a session running smoothly. If your frantic client (or collaborator) works just down the road, spend your money on gas. But if your long-distance phone bill is an inch thick or you constantly fly around the country putting out fires, these remote alternatives can pay off. ●

Judy Getts is a contributing editor for PC World.

EXECUTIVE SUMMARY

Co-Compute 2.1

Remote communications program

Co-Compute provides both terminal/host and synchronized modes, handy for on-line collaboration and teaching. However, the user interface and manual are confusing, and program features are limited.

	POOR	FAIR	GOOD	EXCELLENT
Remote control features		●		
Data security and integrity		●		
Collaboration features			●	
Overall value			●	

WHERE TO BUY

Carbon Copy Plus 5.0
Meridian Technology
7 Corporate Park #100
Irvine, CA 92714
714/261-1199
List price: $195 per module
Requirements: remote module 176K, host module 62K; DOS 2.00 or later version
Copy protected (by serial number)
Technical support: unlimited, no toll-free number, M–F 7–6
Other support services: none

Close-Up 3.0A
Norton-Lambert Corp.
P.O. Box 4085
Santa Barbara, CA 93140
805/964-6767
List price: Support module $245, Customer module $195
Requirements: Support module 128K, Customer module 50K; DOS 2.00 or later version
Not copy protected
Technical support: unlimited, no toll-free number, M–F 7–5
Other support: user BBS, occasional newsletter

Co-Compute 2.1
Harmony Technology Associates
3700 S. Sepulveda Blvd. #332
West Los Angeles, CA 90034
800/622-7600, 213/398-0878
List price: $123.75 per module
Requirements: 55K, DOS 2.00 or later version
Not copy protected
Technical support: unlimited, no toll-free number, M–F 8–6
Other support services: money-back guarantee, free quarterly newsletter, free 30-minute on-line demo, on-line training for dealers and major customers

Co/Session 3.0
Triton Technologies
146 Maple Ave.
Red Bank, NJ 07701
201/741-3232
List price: support $175, application $125, twin pack with support and application $249
Requirements: support module 128K, application module 100K; DOS 2.00 or later version
Not copy protected
Technical support: unlimited, no toll-free number, M–F 8–5
Other support services: money-back guarantee

For more information, see Products Featured in This Issue.

Fax Times Seven

Low-priced PC fax boards put fax convenience at your fingertips—with features you can't get on a stand-alone fax machine for love or money.

TJ Byers

If the line of people waiting to use your office fax machine looks like it belongs in Disneyland, it's time to consider installing a fax board in your PC. Fax boards are high-speed, data-compressing modems that support the internationally recognized Group III fax standard. This makes them compatible with the office fax machine (and they cost significantly less to buy). The main advantage with PC-based fax is that you can send disk-based files to fax machines. In addition, some fax boards offer a modest complement of standard modem features.

There are disadvantages, of course. A stand-alone fax machine lets you feed in hard copy, then converts it to fax format and sends it; the fax machine at the other end rolls out a hard copy. With PC-based fax, you'll need a printer to get hard copies of incoming faxes. Moreover, you'll need to spend $1000 and up for a scanner to *transmit* hard copy—and not every fax board works with a scanner.

Perhaps the biggest drawback with PC fax is that you can't convert incoming fax files to ASCII text—at least without optical character recognition (OCR) software, which seldom produces an error-free file. On the other hand, graphics users and desktop publishers will be happy to learn that many fax boards can convert fax files into graphics formats usable by such applications as *PC Paintbrush*, *Dr. Halo*, and *AutoCAD*.

Not all boards handle all files. Some convert only from ASCII files to outgoing fax; others convert formatted files produced by supported word processors and graphics packages. In all, there are 14 incoming and outgoing file conversions common to PC fax boards.

To help you choose the right PC fax board for your needs, *PC World* and National Software Testing Laboratories (NSTL) took a hard look at seven popular boards, ranging in price from $395 to $1195. The roundup includes Complete PC's The Complete Fax, Quadram's JT Fax, GammaLink's GammaFax, Panasonic's Fax Partner, Microtek's MFAX96, Ricoh's ImageCard, and E.I.T.'s pc-Fax.

All seven fax boards can schedule unattended fax sessions, broadcast identical fax messages to multiple addressees, and queue fax files until a remote station phones in (which is called *polling*). They also all maintain an on-line phone book and support a

zoom function. Five of the seven systems accept input from a scanner, and five provide on-screen help.

The software packages accompanying all seven boards support standard CGA and Hercules Graphics Card display modes, with varied support for EGA and VGA. Unfortunately, because the fax page must be reduced to fit the screen, most fax documents are hard to read on standard monitors unless you use the zoom mode. For this reason, some PC fax software supports high-resolution, full-page displays.

All seven boards deliver background operation, but each one does it slightly differently. Three of the boards take over the PC when an incoming fax is detected and leave you staring at a frozen screen or banging on a locked keyboard. The other four boards let you continue using your PC with only the minor annoyance of delayed keystrokes.

Worse yet, these boards all share a dreadful trait: If you happen to be saving a file when an incoming fax triggers the board to take over your PC, you will suffer data loss or file corruption and possibly both. This means that even when a board permits you to keep working while it receives in the background, you may not save a file without the risk of data loss. This problem has plagued PC fax from day one.

How do the boards compare in terms of performance? NSTL tests show no significant difference in the time they take to send or receive fax files, aside from the predictable speed difference between 9600- and 4800-bps boards. There is, however, a sizable difference in the times the boards take to convert ASCII files into fax files; the MFAX96 came in first, while the slowest board was The Complete Fax.

The Complete Fax

The Complete Fax is a 4800-bps card with a low $499 price tag, but it's not low on features. In addition to ASCII file conversion, The Complete Fax can convert Epson printer files; this ability allows you to use printer control characters in your word processing program to create bold, compressed, or underlined text in documents for fax trans-

ANTHONY RUSSO

FEATURES EVALUATION

Seven PC Fax Boards

Two clear winners—JT Fax and GammaFax—emerge from the pack, mainly on the basis of their broad file-conversion capabilities and scanner support.

	The Complete Fax	Quadram JT Fax	GammaFax	Panasonic Fax Partner	Microtek MFAX96	Ricoh ImageCard	E.I.T. Pc-Fax
Standard features							
Price	$499	$395	$995	$999	$995	$1175	$1195
Bits per second	4800	4800	9600[1]	9600	9600	9600	9600
Slot size required	¾	½	½	¾	full	full	full
Requires TSR installation	●	●	○	●	○	○	●
RAM required as TSR	48K	200K	n/a	20K	n/a	n/a	200K
Installation and support							
Installation software	●	●	●	●	○	○	●
Complete documentation	●	●	●	●	●	●	●
Mouse support	●	●	○	●	○	○	●
Scanner support							
Canon IX-12	○	●	●	●	○	○	○
HP ScanJet	○	●	●	●	○	○	○
Princeton LS-300A	○	●	○	○	○	○	○
Microtek MS-300	○	○	○	●	●	○	○
Chinon N-205	○	●	○	○	○	○	○
E.I.T. PS-2000	○	○	○	○	○	○	●
The Complete Hand Scanner	●	○	○	○	○	○	○
Monitor support							
CGA	●	●	●	●	●	●	●
EGA	●	○	●	○	●	●	●
VGA	○	○	●	○	○	○	○
HGC	●	●	●	●	●	●	●
Tecmar	○	○	○	●	●	○	●
Genius VHR	○	○	●	○	○	●	●
Wyse-700	○	○	●	○	●	○	○

	The Complete Fax	Quadram JT Fax	GammaFax	Panasonic Fax Partner	Microtek MFAX96	Ricoh ImageCard	E.I.T. Pc-Fax
File conversion outgoing							
ASCII	●	●	●	●	●	●	●
Epson	●	●	○	○	○	○	●
80-column	●	●	●	●	●	●	●
132-column	○	●	○	●	○	●	○
WordStar	○	●	●	○	●	●	●
Word	○	○	○	○	○	○	●
PC Paintbrush	●	●	●	●	●[2]	●	●
Dr. Halo	●	○	●	○	○	●	○
AutoCAD	○	○	●[2]	○	●[2]	○	○
Windows	●	○	●	○	○	○	○
File conversion incoming							
OCR	○	○	●[2]	○	○	○	●
PC Paintbrush	○	●	●	●	●[2]	○	●
Dr. Halo	○	○	●	○	○	○	○
AutoCAD	○	○	●[2]	○	○	○	○
File transfer							
On-screen help	●	●	●	●	○	○	●
Background mode							
Sends	●	○	●	●	○	●	○
Receives	●	●	●	●	●	●	●
Permits PC to be used	●	○	●	●	○	●	○
On-the-fly text-file conversion	○	●	○	●	○	○	●
Modem capability	●	○	●	○	○	○	●
Speaker	○	●	●	●	●	○	○

● Yes ○ No

[1] With ATs and compatibles only; 4800 with PCs and XTs.
[2] Available at extra cost.

mission. Unfortunately, The Complete Fax's text-file conversion process is painfully slow.

In the graphics department, The Complete Fax converts files made by *PC Paintbrush*, *Dr. Halo*, and virtually any graphics program that runs under *Microsoft Windows* into fax files. However, The Complete Fax is the only card reviewed that can't return an incoming fax file to one of the graphics formats supported for transmission.

The Complete Fax's software is RAM resident but requires only 48K of memory. Its background mode permits you to keep on working while it sends and receives.

EXECUTIVE SUMMARY

The Complete Fax

PC fax board

The Complete Fax is an inexpensive 4800-bps fax board that proves you sometimes get what you pay for, as evidenced by its primitive phone book and slow file conversion. But if you can accept its limitations, it is a decent, low-cost product.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Setup and installation		●		
File conversion		●		
File transfer			●	
Performance	●			
Overall value		●		

A nice added touch is a software utility that turns The Complete Fax into a conventional 9600-bps modem—but only if there's another Complete FAX board at the other end.

The only scanner supported by The Complete Fax is The Complete Hand Scanner from, you guessed it, The Complete PC. However, as it scans only 3 inches per pass, it's limited to logos, memos, and signatures.

For an inexpensive fax board, The Complete Fax is certainly usable—especially given its unobtrusive background operation. Nonetheless, the inconvenience of 4800-bps operation, slow file conversion, and an inferior phone book make it one of the least attractive entries in the roundup.

JT Fax

Quadram's JT Fax is another 4800-bps board, and at $395 it's very reasonably priced. What's more, it comes packed with features that businesspeople need.

Its text-file conversion capabilities include ASCII, *WordStar*, and Epson printer files. Unlike most fax boards, which handle text conversions by translating the original file to another disk file in fax format, JT Fax converts text on the fly; it doesn't create a disk file, which is why this board has no NSTL file-conversion speed rating.

PC Paintbrush is the only graphics application JT Fax supports, but it works in both directions: Incoming faxes can be converted to *PC Paintbrush* format for viewing and editing. Quadram also provides a screen capture utility, which is one way to convert images from unsupported graphics applications to fax files. The JT Fax works with no fewer than four full-page scanners.

JT Fax's software is RAM resident and requires a hefty 200K of memory, but it can be called instantly—from any application—simply by pressing a hot key. It receives fax messages in the background but won't send them, and its background mode is far from friendly. As soon as it detects an incoming fax, it seizes control, halting the current application and locking the keyboard; only when the incoming fax file has been saved to disk do you get your machine back.

JT Fax is the only board in the roundup to provide automatic printing. As fax files come in, they can be sent directly to the printer,

EXECUTIVE SUMMARY

JT Fax

PC fax board

BEST BUY

Quadram's 4800-bps JT Fax is loaded with features that businesspeople will like, including hot key access, broad file-conversion capability, fast text-file conversion, the ability to work with four scanners, and a low $395 price tag.

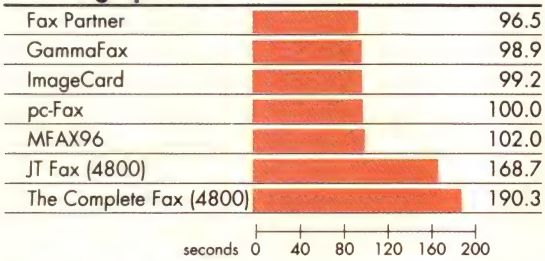
	POOR	FAIR	GOOD	EXCELLENT
Standard features		●		
Setup and installation				●
File conversion			●	
File transfer			●	
Performance		●		
Overall value				●

NSTL TEST REPORT

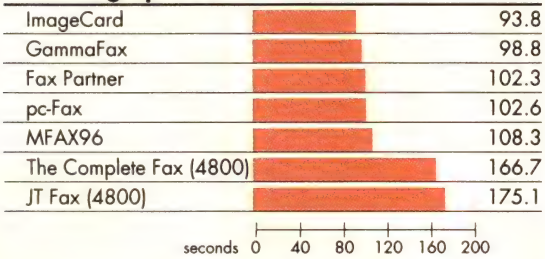
Fax Boards

Transmission and reception scores for the seven fax boards are fairly close, aside from predictable differences between 4800- and 9600-bps boards. Panasonic's Fax Partner edges out the 9600 competition, and Quadram's JT Fax leads at 4800. But remember: Speed is only one of the factors to consider when choosing a fax board.

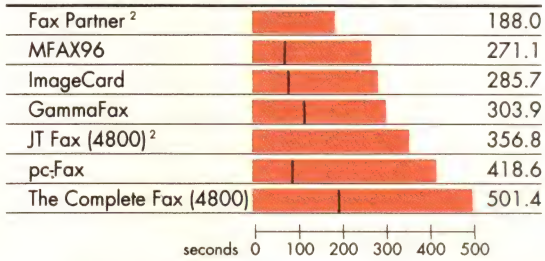
Receive graphics file



Transmit graphics file



Convert ASCII file to fax format and transmit [1]



[1] The time on the left of the bar is the time it took to convert the file.
[2] Conversion is performed automatically; no disk file is created.

Selected files were transmitted between an 8-MHz IBM AT Model 339 equipped with 30MB hard disk, a monochrome monitor, and a GammaFax board, and another 8-MHz IBM AT Model 339 equipped with a 30MB hard disk, an EGA board and monitor, an HP LaserJet Series II laser printer, and the fax board being tested. Before testing began, the first computer's hard disk was formatted, FILES and BUFFERS were both set to 20 in CONFIG.-SYS, and then a graphics file (created by sending a graphics image from a standard group 3 fax machine to a fax board in a PC) was copied to the hard disk. The hard disk of the second computer was reformatted prior to the installation of each board and its software; FILES and BUFFERS were also both set to 20 in CONFIG.SYS. An ASCII file was then copied to the second system's hard disk.

Times were measured from the command to initiate the test until control was returned to the keyboard. Files received by either computer were deleted before performing subsequent tests.

Receive graphics file
This test measures the time required for the test board to receive a one-page graphics file.

Transmit graphics file
This test measures the time required for the test board to send the one-page graphics file received in the previous test.

Convert ASCII file to fax format and transmit
This test measures the time required for the test board's software to convert a four-page ASCII file to fax format ready for transmission and then send the converted file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

just as with stand-alone fax machines. This is fine for unattended operation, but if your printer is already occupied, you'll find a fax download stuck in the middle of your document.

On the whole, JT Fax is impressive, especially considering its bargain list price. It offers fast on-the-fly file conversion in 7 out of 14 modes, four-scanner support, hot-key pop-up access, and reliable screen capture.

GammaFax

GammaLink's $995 GammaFax is top gun in the 9600-bps class, thanks to its convenient user interface, broad file-conversion capability, and ability to drive two full-page monitors—all of which make it an ideal system for *AutoCAD* users and desktop publishers. Optional software even lets you convert *AutoCAD* files for fax transmission.

GammaFax transmits both ASCII and *WordStar* text files, although its ASCII file

EXECUTIVE SUMMARY

GammaFax

PC fax board

GammaFax is a 9600-bps fax board with a great user interface, unusually broad support for text and graphics files, and support for two scanners and two full-page monitors. Optional OCR and *AutoCAD* file conversion complete a very pretty picture.

	POOR	FAIR	GOOD	EXCELLENT
Standard features				●
Setup and installation				●
File conversion				●
File transfer				●
Performance			●	
Overall value				●

conversion is fairly slow. It converts outgoing graphics files from *PC Paintbrush*, *Dr. Halo*, and *Windows*, while incoming facsimiles can be converted to standard *PC Paintbrush* and *Dr. Halo* files. Optional *AutoCAD* conversion software costs $995.

GammaFax accepts input from two full-page scanners. OCR software is also available (for $595) to convert incoming faxes to ASCII text files.

Although GammaFax is rated at 9600 bps, that's true only on ATs; when installed in a PC or XT, its maximum speed is only 4800 bps. The GammaFax board can also be used as a standard modem to transfer DOS files between two GammaFax boards, with the same speed restrictions holding true.

GammaFax can be installed as a foreground or background application. When installed in the background, it allows you to keep working but seems to cause more keyboard delays than other time-sharing fax cards.

Broadcast sessions are controlled by menu-driven software that links an outgoing fax file with a name (or names) in the phone book. If the call doesn't go through, it is tagged for a retry; unfortunately there's no easy way to remove the tag. You may find your PC spending more and more time retrying failed calls.

Overall, GammaFax shapes up favorably. Its file conversion capabilities are the best in the roundup: 11 out of 14 modes are supported. It also provides an excellent user interface, good scanner and full-page monitor support, and optional *AutoCAD* translation. Add it up, and you've got an unusually useful system.

Fax Partner

Panasonic's Fax Partner is a decent, mid-priced ($999) fax board, but it doesn't offer enough value to compete in the crowded 9600-bps market.

Fax Partner's text-file conversion is limited to ASCII, but the board comes with a software utility that squeezes 132 columns of ASCII text onto a standard page—just the ticket for spreadsheet users. Text-file conversions are done on the fly. The only graphics-file format Fax Partner uses is *PC Paintbrush*'s, but fortunately that support works in both directions. What's more, a copy of

EXECUTIVE SUMMARY

Fax Partner

PC fax board

Fax Partner runs at 9600 bps and comes with a free copy of *PC Paintbrush*. A respectable performer with adequate scanner and monitor support and excellent file transfer features, Fax Partner's file conversion capability is its only serious drawback.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Setup and installation			●	
File conversion	●			
File transfer				●
Performance				●
Overall value			●	

PC Paintbrush is included at no extra cost. Fax Partner works with three full-page scanners. It also bundles a screen capture utility called GRAB, but the program's too buggy to be worth much.

Fax Partner's software is memory resident but eats only 20K of RAM. The program sends and receives in the background and lets you keep working with only minimal keyboard slowdown.

Fax Partner has several nice features, including a small plastic box that blinks to let you know a fax has come in, the free copy of *PC Paintbrush*, and a decent background mode. However, it supports only 5 out of 14 file conversion modes. Apart from speed, this board has little to offer that isn't provided by The Complete Fax or JT Fax for considerably less.

MFAX96

Microtek's $995 MFAX96 has an extremely convenient user interface, but once you get past that surface, you'll find this board seriously lacking in features.

EXECUTIVE SUMMARY

MFAX96

PC fax board

The worst file-conversion support in the roundup (unless you're prepared to pay extra for optional software) is just one reason the MFAX96 fails to measure up. A brutal background mode is another. Its only redeeming feature is an excellent menu interface, but that's not enough to justify a $995 price tag.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Setup and installation		●		
File conversion	●			
File transfer	●			
Performance			●	
Overall value	●			

It converts ASCII, extended IBM ASCII, and *WordStar* text files and has the fastest file conversion rate in the roundup. Unfortunately, it has no built-in graphics capability; to convert *PC Paintbrush* or *AutoCAD* graphics, you must purchase optional software from Microtek for $49 and $995, respectively. A screen-capture utility is included, but it's full of irksome bugs.

You can install MFAX96's software as a RAM-resident or foreground application. The background mode is limited to receiving only—and as soon as a fax call comes in, you're frozen out until the session is finished.

MFAX96 provides full support for Microtek's MS-300 series of full-page scanners. It's also the only board with a built-in scanner port; the other PC fax systems use up a second expansion slot or a serial port to accommodate the scanner.

Although MFAX96 sports the nicest menu-driven interface of any board in our roundup, its file conversion is weak: Out of the box it supports only 3 out of 14 modes, the lowest score in the roundup. Furthermore, its background mode is brutal, its screen capture utility needs work, and you must pay for a *PC Paintbrush* conversion utility that comes free with many other boards. Not recommended.

ImageCard

Ricoh's ImageCard starts out with a big strike against it. At $1175, it's one of the most expensive boards in the roundup, and it fails to deliver value to match its price. The unit doesn't support a single scanner or mouse and handles only 6 out of 14 file conversion modes.

ImageCard converts outgoing ASCII and *WordStar* files, but it does so at a poky pace. Outgoing graphics support is provided for *PC Paintbrush* and *Dr. Halo*.

EXECUTIVE SUMMARY

ImageCard

PC fax board

Ricoh's 9600-bps ImageCard is a high-priced product with very little going for it. The file conversion capability is mediocre, no scanners or mice are supported, and the user interface is awkward. You'd expect more for the money.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Setup and installation	●			
File conversion		●		
File transfer		●		
Performance			●	
Overall value	●			

ImageCard software does not require installation as a TSR, unless you want to send and receive faxes in the background. Its background mode does not lock you out.

Considering ImageCard's high price, Ricoh has done some unconscionable corner cutting. There's no on-screen help. You can't print incoming messages until you display them on screen. The phone book does not permit hyphens or parentheses. And the user interface is unimpressive. Despite its manufacturer's estimable reputation, ImageCard is an unsatisfactory entry at a very stiff price.

pc-Fax

E.I.T.'s pc-Fax is another high-end 9600-bps entry. It boasts a proprietary interface that looks and works very much like *Windows*, complete with pulldown menus and dialog boxes—and a price tag of $1195. Like ImageCard, it's a disappointing package for the price.

ASCII, *WordStar*, *Word*, and Epson text files are supported. As for graphics, only *PC Paintbrush* is supported. pc-Fax provides a screen capture utility, but it's extremely difficult to use, and most captured screens look terrible. On the bright side, the package includes an OCR utility at no extra cost. Text-file conversion is handled on the fly.

pc-Fax's software is memory resident and requires a whopping 200K of RAM. An auto-answer option enables pc-Fax to receive (but not send) fax documents in the background—and freezes your application until the incoming fax files are saved to disk.

Utility software is provided to turn pc-FAX into a 9600-bps modem, but (as usual with these boards) a twin must be at the other end of the line. pc-Fax supports only one scanner: E.I.T.'s full-page PS-2000.

Unlike the other reviewed fax systems, which send data directly from a disk file, pc-Fax software uses a procrustean technique that loads fax transmissions into a RAM buffer prior to sending. If the file is too big for the buffer, overflow data is lost.

EXECUTIVE SUMMARY

pc-Fax

PC fax board

pc-Fax offers decent file support, plus a handy OCR utility at no extra cost. But it has a deadly flaw: When the data buffer overflows, information is lost or corrupted. If that's not enough to warn you off, consider its steep $1195 price.

	POOR	FAIR	GOOD	EXCELLENT
Standard features		●		
Setup and installation				●
File conversion			●	
File transfer			●	
Performance		●		
Overall value		●		

pc-Fax supports 8 out of 14 file conversion modes. Its *Windows*-like interface and free OCR software are nice touches, but they don't make up for limited graphics support, the deadly overflowing data buffer, or the temperamental screen capture utility. This is one card to avoid.

Fax, Not Fiction

There are two clear winners in our PC fax roundup, one for each bps rate—and they are both Best Buys. The 4800-bps JT Fax comes out on top, thanks to its four-scanner support, fast text-file conversion, convenient pop-up operation, and low $395 list price.

For heavy fax use at higher speed (and a higher price—$995), GammaLink's GammaFax is clearly the board of choice. It converts a broad range of text and graphics files for fax transmission, supports two full-page monitors, accepts input from two scanners, and even handles *AutoCAD* files with optional software. Its convenient user interface adds to its attraction.

The Complete Fax, Fax Partner, and MFAX96 are adequate, but they simply don't provide the features or performance of the Best Buys. The losers are ImageCard and pc-Fax, whose high prices are not justified by their poor performance and missing features.

PC fax boards aren't about to replace stand-alone fax machines, but they offer real benefits. If a direct link between your PC and remote fax locations appeals to you, these products are undeniably convenient. And with the money and time you save, you can afford to stand in line at Disneyland instead of at your overcrowded office fax machine. ●

TJ Byers is a contributing editor for PC World.

WHERE TO BUY

The Complete Fax
The Complete PC
521 Cottonwood Dr.
Milpitas, CA 95035
408/434-0145
List price: $499
Requirements: 284K, hard disk, DOS 2.10 or later version
Accessories: none
Warranty: 90 days parts and labor
Extended warranty: none
Technical support: no toll-free number, M–F 8–5

Fax Partner
Panasonic Industrial Co.
Division of Matsushita Electric Corp. of America
Two Panasonic Way
Secaucus, NJ 07094
201/348-7000
List price: $999
Requirements: 512K, hard disk, DOS 3.10 or later version
Accessories: none
Warranty: one year parts and labor
Extended warranty: none
Technical support: toll-free number, M–F 8–5, 24-hour toll-free BBS

GammaFax
GammaLink
2452 Embarcadero Way
Palo Alto, CA 94303
415/856-7421
List price: $995
Requirements: 512K, hard disk, DOS 3.00 or later version
Accessories: OCR conversion software $595, AutoCAD conversion software $995
Warranty: one year parts and labor
Extended warranty: none
Technical support: no toll-free number, 24-hour fax number

ImageCard
Ricoh Corp.
Communications Products Group
5 Dedrick Pl.
West Caldwell, NJ 07006
201/882-2000
List price: $1175
Requirements: 640K, hard disk, DOS 2.10 or later version
Accessories: none
Warranty: one year parts and labor
Extended warranty: none
Technical support: toll-free number, M–F 9–5, 24-hour bulletin board

JT Fax
Quadram
One Quad Way
Norcross, GA 30093
404/923-6666
List price: $395
Requirements: 384K, one disk drive (hard disk recommended), DOS 2.00 or later version
Accessories: none
Warranty: one year parts and labor
Extended warranty: none
Technical support: no toll-free number, M–F 8–7

MFAX96
Microtek Lab
16901 S. Western Ave.
Gardena, CA 90247
213/321-2121
List price: $995
Requirements: 384K, one disk drive (hard disk recommended), DOS 2.00 or later version
Accessories: PC Paintbrush conversion software $49, AutoCAD conversion software $995
Warranty: one year parts and labor
Extended warranty: none
Technical support: no toll-free number, M–F 9–5

pc-Fax
E.I.T., Inc.
25 Just Rd.
Fairfield, NJ 07006
201/227-1447
List price: $1195
Requirements: 512K, hard disk, DOS 3.00 or later version
Accessories: PS-2000 scanner $1600 (when purchased with pc-Fax)
Warranty: one year parts and labor
Extended warranty: none
Technical support: no toll-free number, M–F 9–5

For more information, see Products Featured in This Issue.

Introducing ACCPAC, accounting software for those who plan to grow

A family of accounting solutions to meet your growing needs.

ACCPAC® Easy Simple, inexpensive accounting software designed for very small businesses that plan to grow. To get you started immediately, it's easy to install and has a friendly, colorful user interface. It also includes a chart of accounts, a broad range of pre-defined reports and very affordable price—just $89 per module.

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ACCPAC BPI® Accounting Provides a powerful full-function accounting system at an amazingly low price—just $395 per module. ACCPAC BPI Accounting is designed for small and medium businesses that need sophisticated General Accounting, Accounts Receivable, Accounts Payable, Payroll, and Inventory software.

Tying these five modules together is an extremely friendly user interface in vivid screen colors of your choice. Additional features include: "Suspend"—stop work in one module, complete a task in another, and return to the point where you left off; "Selector"—search, for example, a chart of accounts or customer list for forgotten data and transfer directly to a data entry form; and one-time printer configuration. You can also key in and edit batches of information, then post them to both the subsidiary and general ledgers simultaneously.

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In Canada: **1-800-663-6904.**

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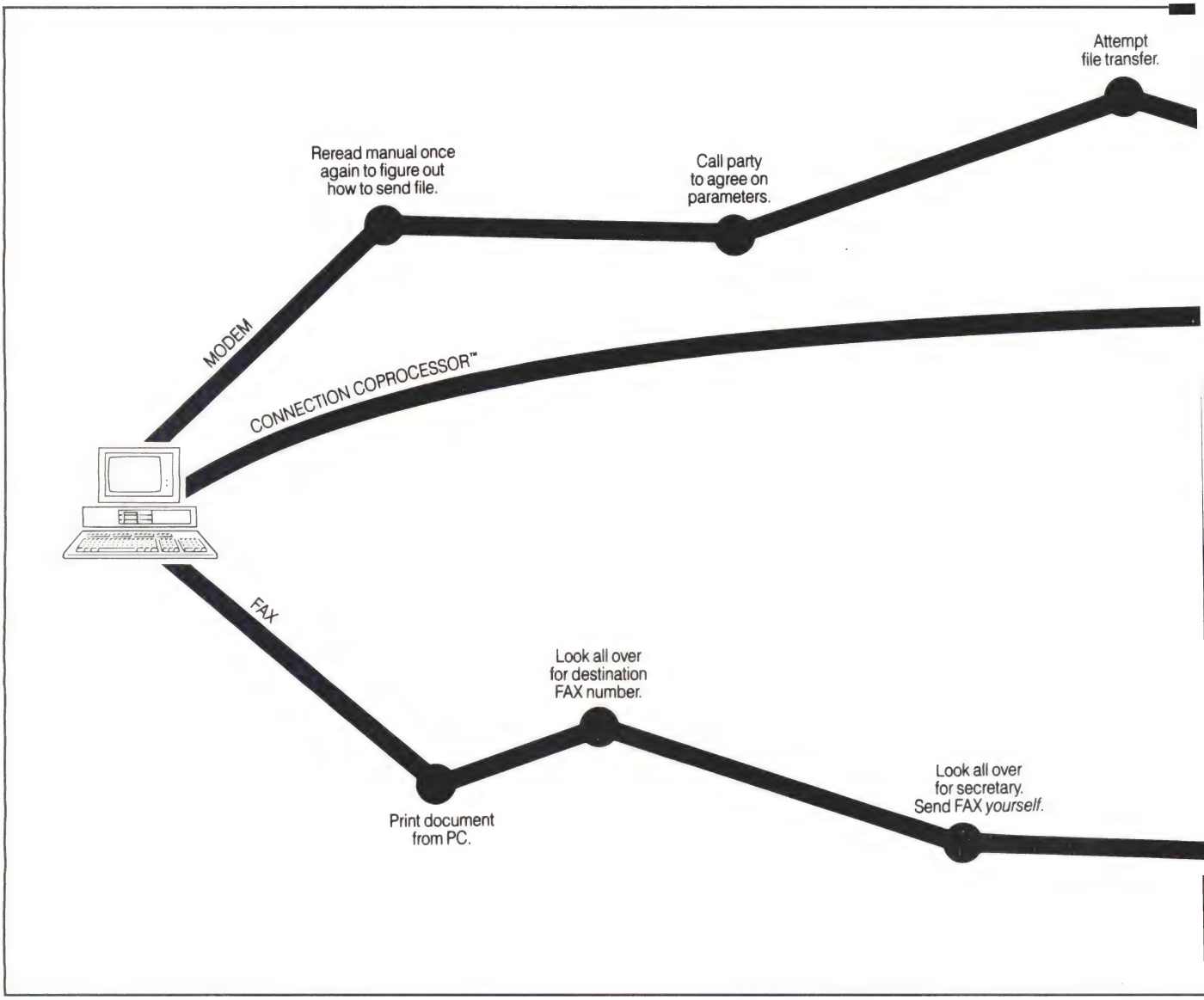
Intel announces



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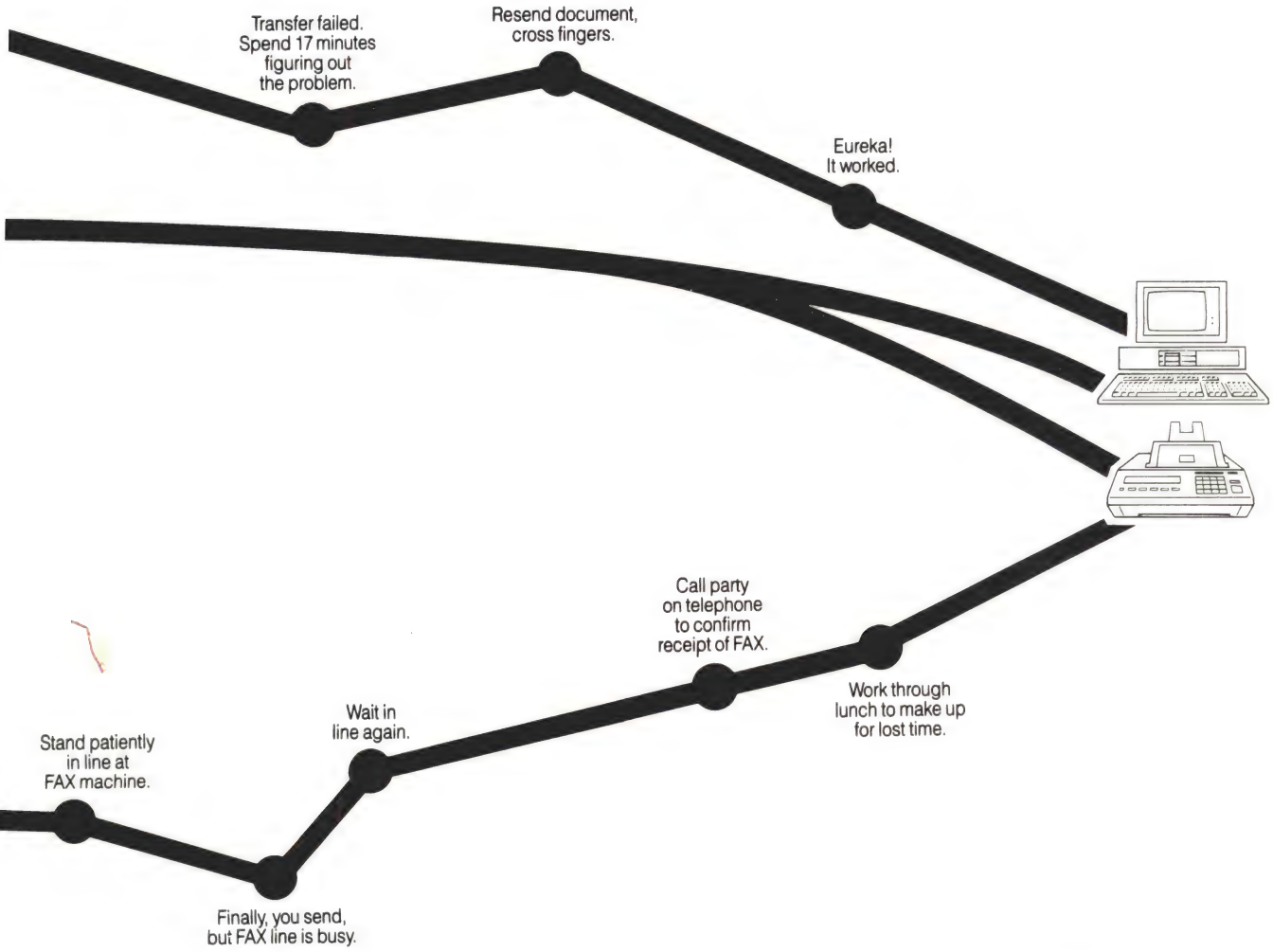
non-stop flights.



another Connection-equipped PC, you won't have to fiddle around with modem parameters or protocols. Because the Connection CoProcessor sets them for you. At 9600 bps.

Best of all, Connection supports CAS,* a new communication standard that is supported by major software and hardware developers like Ashton-Tate,® Borland,® DCA,® Microsoft,® and WordPerfect.® Which means you can send, for example, a word processing file to your London office, without ever exiting your WordPerfect program.

You just send the document directly from your application. That's it. There isn't any complicated communications software to learn.

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So what are you waiting for? Call 800-538-3373 now for a free demo disk.

Because with Intel's Connection CoProcessor, communication is really going to take off.

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134 **Dell 220**
What's hot, compact, and tightly integrated? The Dell 220, a rip-roaring 20-MHz 286 system that performs like a 386.

136 **Mach20**
Microsoft's multifunction 286 accelerator board gives your XT some next-generation features like a built-in mouse port and support for 3½-inch drives and OS/2. But it won't give your system next-generation speed.

144 **Xerox 4020**
If your business reports demand gorgeous color but you can't manage $8000 for a thermal wax printer, Xerox's $1495 color ink jet printer can probably do the job.

148 **NEC MonoGraph**
High-speed screen updates, kerned fonts in ROM, and crisp images earn this full-page paper-white monitor top marks for desktop publishing.

Dell 220

AT-compatible system

BEST BUY

PROS: High-speed CPU, small footprint, VGA and hard disk controller on motherboard

CONS: Limited expandability

Depending on how you look at it, Dell's 20-MHz 220 represents either the dying gasp or the brilliant culmination of a long string of 80286-based PCs. With 80386-based systems becoming increasingly common (and increasingly affordable), who needs another 286 machine, no matter *how* fast or *how* low priced?

Dell, the Austin, Texas–based company known in a former incarnation as PC's Limited, clearly feels the answer is "everyone" and is backing up its claim by introducing one of the hottest, smallest, most tightly integrated 80286 systems ever offered. With a blazing 20-MHz CPU, less-than-one-wait-state memory access, and disk caching, this machine challenges the performance of low-end 80386 systems. In fact, National Software Testing Laboratories (NSTL) tests show the 220 beating two 16-MHz 80386 systems on every test except *AutoCAD*. The Dell zipped through the NSTL Crash Test with no problems worth mentioning.

The Dell 220 comes in two basic configurations. $3299 buys you a system with 1MB of RAM, a fast 40MB hard drive, a 1.44MB 3½-inch floppy drive, a 101-key keyboard, a VGA, and a color monitor; $2299 buys a similar system with a monochrome monitor and no hard disk. Both versions provide a generous 8MB of motherboard memory expansion, OS/2 capability, and a socket for a 10-MHz 80287 math coprocessor.

The 220's amazing speed is due largely to its hot new 20-MHz chip, custom manufactured by Harris Corporation. To keep memory from falling behind the CPU speed, Dell provides *less-than-one-wait-state* memory access—standard terminology for its combination of memory paging and interleaving.

But the compact 220 is far more than a fast AT clone; it combines speed, integrated hardware, and one of the smallest footprints ever offered in a desktop system. The VGA, serial ports, parallel port, and even the hard disk interface are built into the motherboard, leaving the three 8/16-bit expansion slots open for more exotic expansion boards.

On the other hand, its snug system unit and integrated hardware have drawbacks. Three slots are not a lot. There's no room for 5¼-inch drives, and just enough space for two half-height 3½-inch floppy drives and one 3½-inch hard disk. And the built-in disk interface could present problems if you want to add a hard drive larger than 100MB.

The system comes with 1MB of RAM; this can be upgraded to 8MB without slowing memory access by substituting 1MB SIMMS (when they become available) for the 128K SIMMS on the motherboard. Additional RAM can be installed via expansion boards, but access to this memory is limited to the 8-MHz speed of the I/O bus.

Peripherals are all excellent. The keyboard is a standard, high-quality, 101-key Key Tronic device. Unfortunately, Dell has followed IBM's classic (and awkward) design and placed the keyboard socket in the back of the cabinet. You have a choice of three monitors: the VGA Color, the higher resolution VGA Color Plus, and the VGA Monochrome.

Setup and configuration are easy, thanks to a slim but complete owner's manual. You also get a disk with menu-driven diagnostics. A ROM-based utility allows you to install peripherals without setting motherboard jumpers. Best of all, one year of service from Honeywell Bull is included at no extra cost. (On-site service is provided if you live within 100 miles of a Honeywell service center.)

Despite the 220's cramped system unit and limited expandability, any 80286 system that performs like an 80386 is worth applauding—even if it won't run 80386-specific software like *Windows/386*. When you add its tiny footprint, OS/2 capability, and surprisingly low price, the Dell 220 may inspire many users to decide they can live without that new 80386 for a few more years. —*John Diebold*

WHERE TO BUY

Dell 220
Dell Computer Corp.
P.O. Box 203818
Austin, TX 78720-9964
800/426-5150
List price: with 1MB RAM, 1.44MB 3½-inch floppy drive, VGA, monochrone monitor, 101-key keyboard $2299; with 1MB RAM, 40MB hard disk, 1.44MB 3½-inch floppy drive, VGA, color monitor, 101-key keyboard $3299
Accessories: 29ms 100MB hard drive $1599; 720K 3½-inch floppy drive $150, 1.44MB 3½-inch floppy drive $200; VGA Monochrome Monitor $200, VGA Color Monitor $400, VGA Color Plus Monitor $500; serial mouse $60; 2400-bps internal modem $200; 10-MHz 80287 math coprocessor $480; DOS 3.30 $120, OS/2 $325
Warranty: one year
Extended warranty: none
Technical support: toll-free number, M–F 8–5
Other support services: one-year service contract, extendable for about 10 percent of system price per year
For more information, see Products Featured in This Issue.

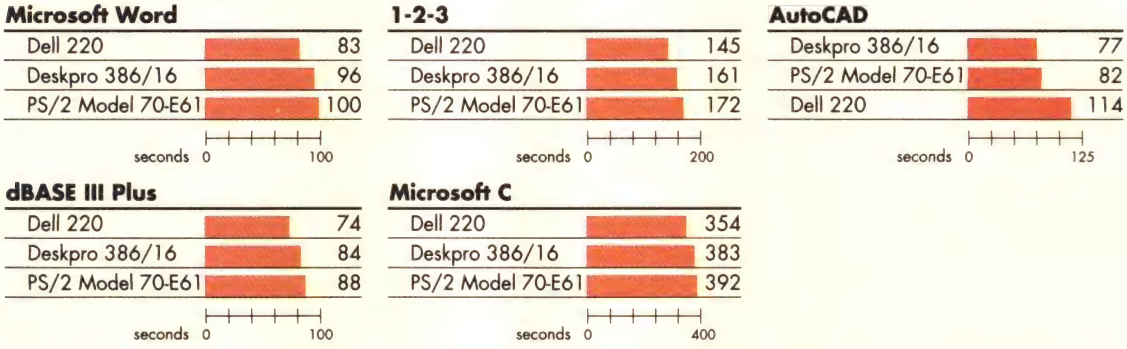
The Dell 220 is a bargain-priced, 20-MHz 80286 speed demon that outperforms some 80386 machines.

JOHN GREENLEIGH

NSTL TEST REPORT

Dell 220 Versus Two 80386 Systems

Dell's 20-MHz 80286 speedster easily outruns two 80386 systems in four out of five NSTL benchmarks. Slow performance on the AutoCAD test probably reflects the Dell's lack of a 80387 math coprocessor.



The Dell 220 was tested with a 40MB hard disk and a disk cache consisting of 256K of extended memory. The IBM PS/2 Model 70-E61 was tested with a 60MB hard disk and a disk cache consisting of 256K of extended memory. The Compaq Deskpro 386/16 was tested with a 43MB hard disk and a disk cache consisting of 256K of extended memory. All tests except for the *1-2-3* test were conducted with a coprocessor installed.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no screen access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The Microsoft C benchmark measures the time required to compile and link XLISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives, then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

Mach20

Multifunction 80286 accelerator board

PROS: Combines many functions in one slot, OS/2 compatible

CONS: Mediocre performance, complicated setup

All too often, as users attempt to take advantage of the tempting array of expansion boards for their poky PCs and XTs, they hit the slot barrier. The multifunction Mach20 accelerator board from Microsoft is designed to break the slot barrier by combining an 8-MHz 80286 accelerator-and-mouse-port board with three piggyback modules: Two work together to provide RAM expansion, and one lets you install 720K and 144MB 3½-inch drives and 1.2MB 5¼-inch drives in your trusty old PC.

The basic 80286 accelerator board, with a built-in socket for a Microsoft Mouse, costs $495 and includes no memory. Installation is straightforward: You slide the board into a vacant slot, after which you remove the PC's old 8088 CPU and replace it with a plug-and-cable assembly.

The Mach20 passed the NSTL Crash Test with flying colors, but as an 80286 accelerator it's a bit of an underachiever. According

TI's OmniLaser™ 2115. The network printer you need when your application needs are demanding.

The high-speed laser printer for shared-resource environments that can handle many people performing many tasks.

TI's OmniLaser 2115 printer provides the flexibility you need in multi-application environments. Especially where you have several different hardware systems attached to a network.

Built-in emulations mean an OmniLaser can satisfy the needs of virtually any application. It can produce desktop publishing output using the Adobe PostScript® page description language. It can emulate a dot-matrix printer for spreadsheets and draft text. Or an HP LaserJet® for word processing and business graphics. Even a plotter for advanced graphics.

Best of all, with speeds of up to 15 pages per minute and a duty cycle of 25,000 pages per month, it can satisfy the needs of even the busiest group of professionals.

You can connect an OmniLaser to virtually any computer or network. It features multiple standard interfaces for IBM®, DEC®, Apple®, even specialized hardware like CAD/CAM workstations.

Trouble-free paper handling.

The OmniLaser 2115 prints beautifully on a variety of paper stocks and sizes. Its two 250-sheet paper trays let you load stationery, letter- or legal-size paper, and select the size you need through its easy-to-use front control panel.

The right printers for right now, and in the future.

With the OmniLaser 2115, you have the flexibility you need for today's sophisticated printing applications. You also have the confidence of knowing that your OmniLaser offers a safe path to the applications of the future.

The OmniLaser family also includes the 2106 workstation printer and the 2108 small-cluster printer. So whatever the demand of your application, there's a multipurpose OmniLaser that's right for you.

To find out more, call Texas Instruments toll-free **1-800-527-3500.**

TEXAS INSTRUMENTS

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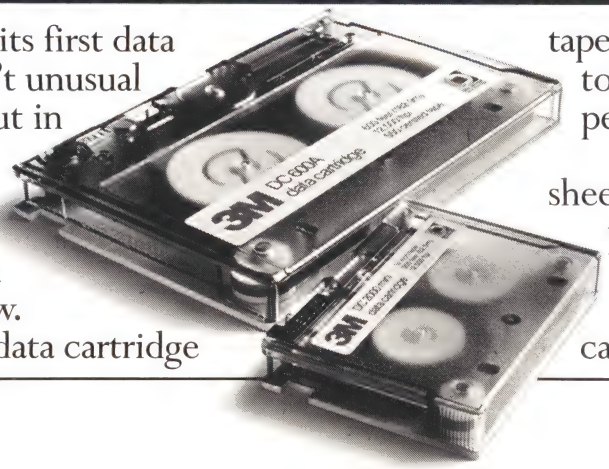
To create the world's first data cartridge tape, our engineers had to give up a lot of dreams.

To bring the world its first data cartridge tape, it wasn't unusual for our engineers to put in a little overtime on their overtime. Or occasionally miss the late show. Or even miss the late, late show.

And even after the data cartridge tape was born, they still refused to lay low. It had to be perfected.

So, instead of counting sheep, our engineers counted patents. In fact, over ten of them are in use today. A number no other data cartridge tape manufacturer



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can even come close to matching.

During other sleepless nights, they'd toss and turn over technological breakthroughs like proprietary Blackwatch™ backcoating, No End Play (NEP) hub designs, Dura-Stat™ drive rollers and one piece tape guides for precision tracking.

The result was the ultimate data cartridge tape.

And to this day, it's number one in the world by a long shot.

So, if you're looking for data cartridges and diskettes that offer durability, longevity and superior error performance, try one of ours.

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FEATURES EVALUATION

Dell 220 Compared to IBM PS/2 Model 50 Z

The Dell 220 offers high speed, high memory expansion, and low cost compared to the 50 Z. Unfortunately, its hard disk options are as limited as the 50 Z's.

	Dell 220	IBM PS/2 Model 50 Z
Standard features		
Price	$3299 [1]	$3995 [2]
CPU	80286	80286
Clock speed/wait states	20 MHz/ less than 1	10 MHz/0
Built into motherboard		
Parallel ports	1	1
Serial ports	2	2
Floppy disk controller	●	●
Video adapter	●	●
Mouse port	●	●
Coprocessor support	10-MHz 80287	10-MHz 80287
Memory capacity		
Amount shipped with unit	1MB	1MB
Maximum installable on motherboard	8MB	2MB
Expandability		
8/16-bit expansion slots/number free	3/3	3/3
8-bit expansion slots/number free	0/0	0/0
Half-/full-height storage device bays	2/1	3/0
120MB or larger hard disk available from manufacturer	○	○
Ergonomic design		
Front-panel reset button	○	○
Front-panel on/off switch	●	●
Front-panel keyboard socket	○	○
ROM-based setup software	●	○
Tilt-and-swivel monitor	●	●
Compact footprint	●	●
Complete documentation	●	●

● Yes ○ No

[1] Price based on 1MB RAM, 40MB hard disk, 1.44MB floppy drive, parallel port, two serial ports, VGA, color monitor, 101-key keyboard.

[2] Price based on 1MB RAM, 30MB hard disk, 1.44MB floppy drive, parallel port, two serial ports, VGA, color monitor, 101-key keyboard.

to the NSTL performance test, an IBM PC XT with the Mach20 installed ran only about half as fast as an Acer 910 on most tests. Although that's a lot better than an unmodified XT, users can get comparable speed increases with products that cost half as much, such as Orchid's Tiny Turbo.

Of course, lower-price accelerator boards may not run OS/2; in fact, when Microsoft gets its special Mach20 version of OS/2 out of beta testing, the Mach20 will be one of few boards that can. However, you'll need to install the optional Memory Plus module, since OS/2 requires a 16-bit data path.

The $395 Memory Plus module consists of two piggyback circuit boards and comes with 512K of 150ns RAM. Up to 3.5MB can be installed, but you'll have to get the memory chips yourself; Microsoft won't provide them. Microsoft does offer a LIM 4.0–compatible expanded memory driver. Memory Plus RAM can also be used to backfill conventional RAM to 640K.

But the Memory Plus module has a couple of minuses. Other memory boards (including standbys like AST's SixPakPlus and Intel's AboveBoard) conflict with the Memory Plus, rendering it useless. Also, with both Memory Plus circuit boards attached, the Mach20 barely fits in the space allotted for a single XT-size board. Users will need to make sure that the board's circuit leads do not touch any adjacent expansion board.

The $99 Disk Plus floppy controller snaps into a Mach20 pin socket. However, configuring the Disk Plus—and, indeed, the whole Mach20 enchilada—is distressingly complicated. You must set numerous banks of jumpers on all three of the Mach20's components and consult a hardware interrupt chart to avoid conflicts.

Potential buyers should also be aware of one more possible problem: With all three piggyback modules installed, the puny 63.5-watt power supply in the original IBM PC is inadequate. (The 135-watt power supply in the XT and most clones should be fine.)

The Mach20 is a veritable Swiss army knife of options. But as with many multipurpose devices, performance of individual features may be less than optimal. Where speed

ALL TERRAIN VEHICLE.

ZENITH'S BATTERY-POWERED 386 PORTABLE WORKS AS WELL ON A MOUNTAINTOP AS IT DOES ON A DESKTOP.

NITH INNOVATES AGAIN—with the single most revolutionary portable mputer ever created. The TurbosPort 386.™ The only *true* battery-wered 386 portable with all the performance of a desktop…and en some.

Perhaps the peak of TurbosPort 386's technology is Zenith's Page hite™ display. A visible breakthrough that virtually duplicates printed-ge clarity with sharp black images on a fluorescent backlit screen.

Inside TurbosPort is a tremendous power team, yet of diminuitive portions. The 80386 microprocessor harnessed with a fast access MB hard disk lets you surmount all tasks effortlessly. And with zero it state technology TurbosPort 386 gives you 50% greater speed an other 12MHz systems that still have wait states.

Plus, there are even more exclusives. Zenith's *Intelligent Power nagement System*™ lets you control power usage for maximum battery life. And a detachable keyboard (unheard of on any other battery-powered 386 portable). These, combined with all the other breakthroughs help explain why Zenith has become the leader in battery-powered portables.

You may never scale a mountain with TurbosPort 386, but with 14.7 lbs. of desktop performance under your arm, you'll definitely reach new heights. For the name of your nearest Zenith Data Systems Dealer, call: 1-800-553-0559.

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386 SYSTEMS

Is it time to buy? Which one is best?

Here's how to find out.

It's the future of personal computing. For power and speed, 386 PCs outclass all other machines.

For large spreadsheets and databases, the 386's dramatically faster performance is ideal. And for emerging applications like networking, desktop publishing, CAD, statistical analysis, expert systems and real-time animation, the 386 is *essential*!

You can expect to see an increasing number of programs that run efficiently *only* on a 386 system. To maximize the multitasking capabilities of OS/2, its tremendous processing power is a must.

But should you buy *now* — or *wait* for still further improvements? Which system is best — and what specific configuration suits your needs?

The choices are many — and potentially confusing. There are 16MHz, 20MHz and now 25MHz 386 machines. Huge differences in performance. Exaggerated promises by vendors. *Among the variables you must consider:* OS/2 capabilities, disk and memory caching, clock speeds, display adapters, real and protected modes, compatibility, expandability...and more.

New report has the answers.

Now there's a solution. *PC Digest*'s authoritative, comprehensive report on 386 systems. It's just off the press. With concrete recommendations based on objective laboratory tests. Including the first OS/2 multitasking tests for the 386. And an exclusive preview of IBM's 70 series and Compaq's 25MHz PC.

We tested 19 machines, including the *ALR FlexCache 386, AST Premium 386/20, Compaq Deskpro 16 and 20, Dell 310, Everex 20 and IBM's PS/2 70's and 80's.*

Our technicians evaluated each machine for ease of installation and handling, applications-based performance, features, documentation, and software incompatibilities.

In *PC Digest*'s new 386 report, you'll find an in-depth tutorial covering 386 technology (including memory caching, memory architecture and numeric co-processors)....Detailed writeups on each machine.... Performance test results....

EXCLUSIVE!

First tests of the new IBM and COMPAQ 25MHz PCs!

Included with this report are the *first* benchmark tests of the newly announced IBM and Compaq 25MHz PCs. These are high-performance PCs with remarkable power and speed engineered into a small-footprint box. Which one is best? Here are the facts. A *PC Digest* exclusive!

Complete specifications (including configurations, options, prices, support and warranties) ....And a Master Summary Chart that shows *at a glance* our ratings and recommendations for each PC tested.

Some of the results.

Our tests uncovered some revealing conclusions:

- The outstanding across-the-board performance of two machines won them *PC Digest*'s coveted Five Stars — our highest rating.
- IBM's PS/2 Model 80 20MHz model was beaten by most of the other 20MHz systems tested.
- In the 20MHz systems, memory caching is essential to high-level performance.
- One 16MHz machine runs DOS applications acceptably, but functions *terribly* under OS/2.
- Avoid the machine that rated *dead last* — its performance in *every* category was well below average.

From PC World's official research facility.

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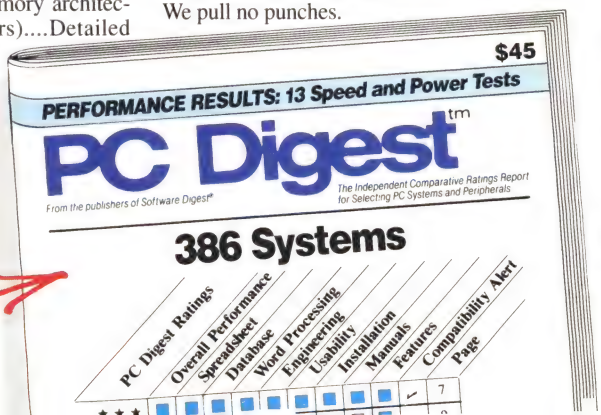

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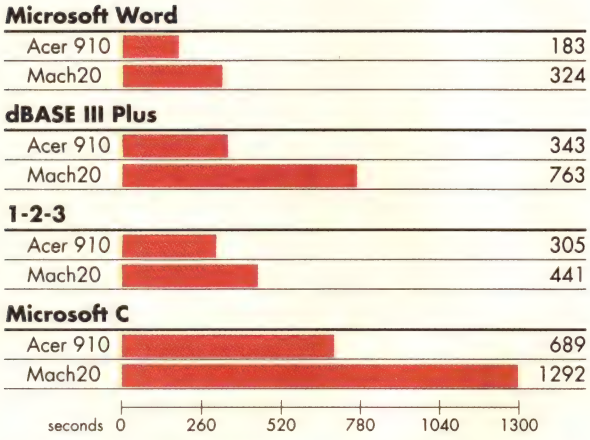
NSTL TEST REPORT

80286 Accelerator Boards Compared

Installed in an IBM PC XT, the 8-MHz Mach20 80286 accelerator board runs significantly slower than the 10-MHz Acer 910.



The Microsoft Mach20 was installed on an IBM PC XT with a 10MB hard disk and 640K of RAM. The Acer 910 had a 44.5MB hard disk and 1MB of RAM. All machines were tested without a disk cache installed.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The Microsoft C benchmark measures the time required to compile and link XLISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

is vital, users will be better off selecting one of the faster—and cheaper—80286 turbo boards. —*Lewis Perdue*

WHERE TO BUY

Mach20
Microsoft
16011 N.E. 36th Way
Box 97017
Redmond, WA 98073
206/882-8089
List price: $495
Requirements: 8088-based PC, XT, or compatible
Accessories: Disk Plus $99; Memory Plus with 512K RAM $395; Microsoft Mouse with Microsoft Windows 2.01 and PC Paintbrush $165
Warranty: two years parts and labor
Extended warranty: none
Technical support: no toll-free number, M–F 8:30–6
Other support services: none
For more information, see Products Featured in This Issue.

Xerox 4020

Color ink jet printer

PROS: Good color graphics, decent printing speed

CONS: Requires expensive coated paper

If you need good-looking color transparencies, graphs, and graphics for presentations but can't afford $8000 for a high-end thermal-wax printer, the Xerox 4020 color ink jet may be the machine for you. A reasonably priced ($1495) printer with gorgeous color print quality, the 4020 also boasts unusually broad graphics software support. Although it costs $100 more to buy than HP's plain-paper Paintjet, it is easier and cheaper to use, and produces better-looking output.

The wide-carriage printer weighs only 24 pounds. It uses 20 ink nozzles and four ink colors—black, cyan, magenta, and yellow—to produce up to 4096 distinct shades. It can generate graphics and text at 120 dots per inch (dpi) in draft mode and 240 dpi in near letter quality (NLQ) mode. Its front-mounted control panel has push buttons

You'll recognize the page on the bottom as the one printed on the HP LaserJet Series II™ — the industry standard for laser printing.

Notice that the page on top looks remarkably similar. In fact, it's identical right down to the HP typeface.

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The Xerox 4020 color ink jet printer.

JOHN GREENLEIGH

for start/stop, linefeed, and formfeed, plus LEDs to indicate paper out and low ink. Since it requires coated paper, operating the 4020 will run you between 13 and 20 cents a page, which is still considerably cheaper than the Paintjet's 25 cents per page.

This silent printing machine shines brightest with graphics—not a dot is left uninked—but you pay for quality with speed; in graphics mode, the 4020 performs only slightly faster than an old Epson MX. In text mode, however, the 4020 rolls out a 200-word, double-spaced page in 24 seconds draft, 45 seconds NLQ.

The 4020 comes with five resident fonts: 10-, 12-, and 17-pitch gothic; 10-pitch gothic italic; and 12-pitch roman. It offers 13 foreign-language character sets as well, plus expanded and compressed text, superscripts and subscripts, and underlining.

More than 150 software packages support the Xerox 4020, including *Ventura Publisher, PageMaker, Microsoft Windows, AutoCAD, GEM, Draw Applause, 1-2-3,* and *WordStar.* For users whose software doesn't support the 4020, the unit also offers Diablo C150 emulation.

Setting up the printer is simple. Its four ink wells come prefilled. The key step is installing the maintenance fluid cartridge, which must be replaced every 800 pages. The 4020 lets you know when it's time to refill an ink color—about every 70 pages—by turning on a warning light.

Xerox sells rolls of coated paper in 8½- and 11-inch widths. The latter width lets you take advantage of the 4020's wide carriage to produce landscape output. Coated fanfold paper is also available.

While the Xerox 4020's speed and output quality can't compare to thermal-wax color printers like the Tektronix 4693D, it's much cheaper and delivers consistently good output. If you're looking for good color printing for in-house reports and transparencies, you can hardly do better for the price. —*Alan Southerton*

WHERE TO BUY

Xerox 4020
Xerox Corp.
901 Page Ave.
Fremont, CA 94538
415/791-4000
List price: $1495 (with one parallel or one serial port)
Accessories: 8½-by-11-inch coated paper (2500 sheets) $105, 8½-inch-by-82-foot coated roll (6 rolls) $77, 11-inch-by-82-foot coated roll (6 rolls) $95, 9½-by-11-inch coated fanfold paper (500 sheets) $60; transparencies (50 sheets) $67; ink cartridges (package of two) $11; maintenance fluid cartridge $18; maintenance fluid $14, printhead protection fluid $9; starter kit with roll feeder and various accessories $170
Warranty: one year parts and labor
Extended warranty: through dealer only
Technical support: no toll-free number, M–F 8–12:30, 1:30–6
For more information, see Products Featured in This Issue.

NEC MonoGraph

Full-page paper-white monitor

PROS: Speedy screen update, PostScript-compatible fonts in ROM

CONS: Doesn't work with all systems

If the thought of buying a full-page monitor to make desktop publishing more convenient conjures up visions of molasses-slow screen updates as the video board shuffles hundreds of thousands of pixels around, you'll be glad to hear about NEC's small-footprint MonoGraph. This $1999 monitor pairs an 8/16-bit

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PC MAGAZINE EDITOR'S CHOICE

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Simply replace the "motherboard" of your present system with a Renegade 386™ motherboard.

It takes a screwdriver and less than 20 minutes. And costs but $1695.

That's *thousands of dollars less* than a new IBM System/2 Model 80.

But it gives you more than just the latest industry standard. You can run your old software on it. Probably anything you now use on your XT or AT. Big Blue can't do that.

You can use your present 16-bit peripherals. (If you've looked at PC "add-on" cards, you already know your old equipment would be useless.)

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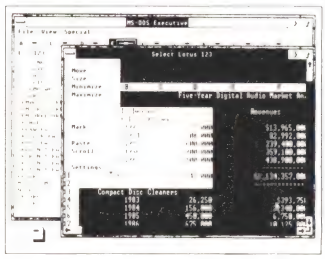

Multi-task with Lotus 1-2-3 and other applications running side-by-side on the Microsoft Windows/386 desktop.

The Renegade 386™ board comes with an iron-clad *one year limited warranty.* It uses genuine U.S. made Intel 386 chips and is designed and manufactured in the U.S.A. by Hauppauge Computer Works. Hauppauge is a major developer of software support for Microsoft and IBM products, and is producer of the highly respected Hauppauge 8087 or 80287 highspeed math coprocessors. Over 50,000 have been sold.

Major computer magazine reviews in the last year have hailed our Hauppauge-made board as a major breakthrough in a high speed, high power, high performance upgrade product.

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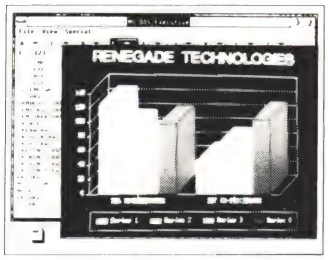

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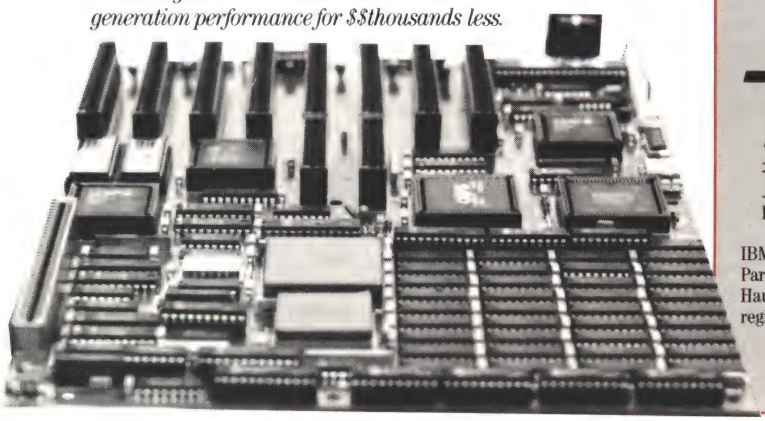

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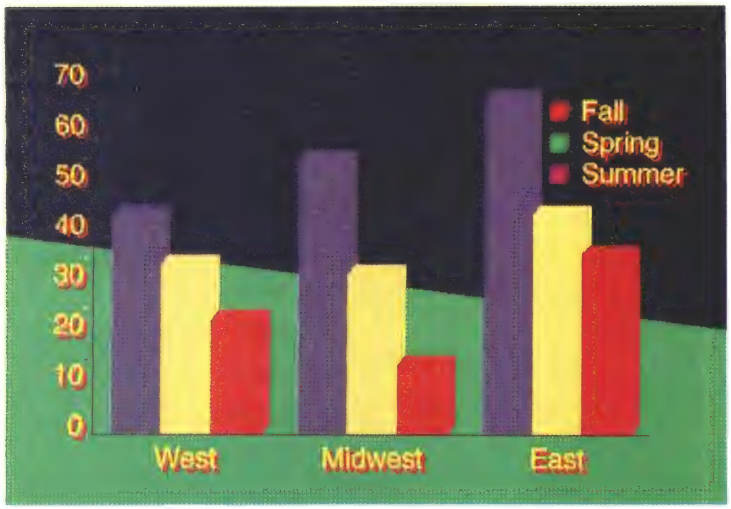

Output from the Xerox 4020 color ink jet printer demonstrates high-quality graphics but requires coated paper.

video adapter with a built-in graphics coprocessor to make screen updates fly. Better yet, it costs $400 less than the only other similarly equipped monitor—the Verticom 2Page—and offers higher resolution.

The MonoGraph's 16-inch, portrait-mode, paper-white screen is easier to read than those on larger 19-inch monitors like the $2395 Viking 1—yet takes up no more desk space than NEC's MultiSync II monitor. It boasts 100-dpi resolution, delivering admirably crisp graphics and text. And unlike most "full-page" monitors, when you bring up *Ventura* in full-page mode, MonoGraph actually shows you a full page.

The MonoGraph achieves its speedy screen updates thanks to an on-board 82786 graphics coprocessor from Intel. Pushing pixels onto the screen at 1024-by-1024-pixel resolution, this chip rewrites the screen several times faster than would be possible if the system CPU were in charge.

Most full-page displays have their fonts in software; to speed performance the MonoGraph puts 15 high-resolution display fonts in hardware. Many full-page displays can't show kerning on screen; the MonoGraph's ROM fonts are kerned and PostScript compatible, so the screen image should preview the printed page exactly.

The MonoGraph system comes with software drivers for *GEM/3*, *Ventura Publisher*, and *Microsoft Windows*. It also provides hardware-level CGA emulation, so you won't need a second monitor for your regular programs—not even *Flight Simulator*. The CGA images (320- and 640-by-200-pixel resolution) are double scanned for improved 320- and 640-by-400-pixel resolution.

The MonoGraph's video board is unhampered by jumpers and DIP switches, making it a snap to install. Unfortunately, power requirements and hardware conflicts limit the systems you can install it *in*. The video board requires 75 watts, which is far beyond a PC's capacity; even some XTs will struggle under this load. And BIOS conflicts may cause compatibility problems with PCs such as the AMT 286. But NEC claims the display will work with 90 percent of the PCs on the market, including machines made by IBM, Compaq, and NEC.

The MonoGraph's high-speed screen updates, prekerned ROM fonts, large screen, and crisp paper-white image make it an excellent choice for desktop publishing. However, its large power consumption and BIOS problems prevent its use in some systems. This is definitely a case of try before you buy. —*TJ Byers*

WHERE TO BUY

NEC MonoGraph
NEC Home Electronics
1255 Michael Dr.
Wood Dale, IL 60191
312/860-9500
List price: $1999
Accessories: none
Requirements: 135-watt power supply
Warranty: one year parts and labor; CRT two years parts, one year labor
Extended warranty: none
Technical support: toll-free number, M–F 8–5
Other support services: 24-hour toll-free bulletin board
For more information, see Products Featured in This Issue.

John Diebold is a marine geophysicist specializing in computer analysis of seismic data. Lewis Perdue is the editor and publisher of PC Management Letter. *Alan Southerton is a senior technical writer for Progress Software in Bedford, Massachusetts. TJ Byers is a contributing editor for* PC World. ●

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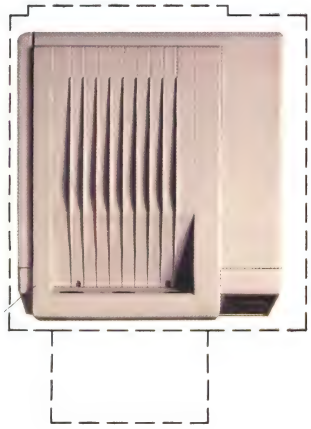

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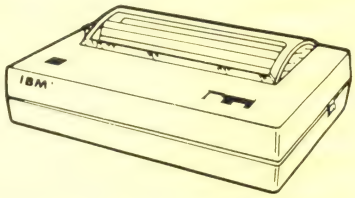

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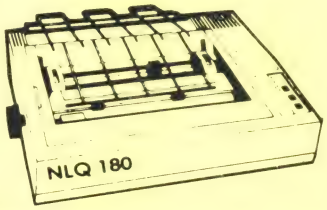

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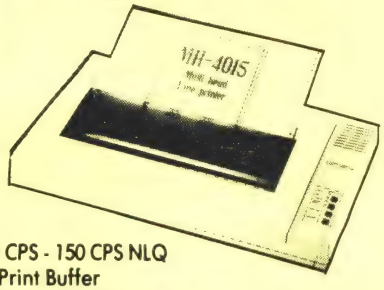

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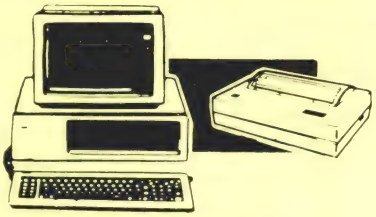

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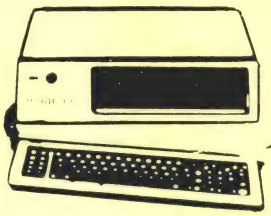

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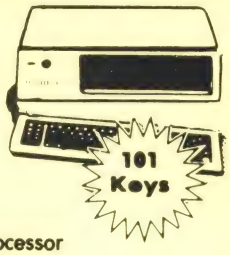

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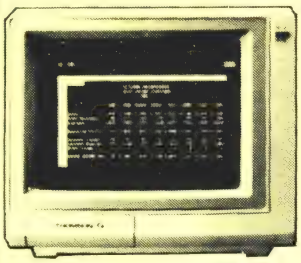

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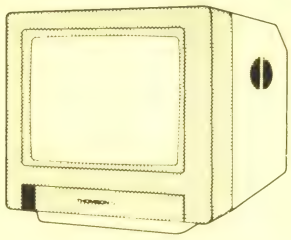

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156 **PageMaker 3.0**
Automatic text flow and paragraph styles give *PageMaker* more clout in handling long documents.

158 **Draw Applause 1.0**
Ashton-Tate's exemplary business graphics package shines at color output.

164 **Manuscript 2.0**
Long popular for technical documentation, the Lotus word processor's new editing features suit it for long, complex documents.

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Thanks to a clever built-in expert system, *Forecast Pro* gives you a statistical glimpse into your business's future.

PageMaker 3.0

Desktop publishing program

BEST BUY

PROS: Improved long-document handling through style sheets and automatic text flow, wraps text around irregularly shaped graphics, creates spot-color overlays

CONS: Unreliable hyphenation, lacks some advanced text editing features, no text search and replace, can't anchor graphics to text

Until recently, choosing a desktop publishing package was pretty simple. If you put out newsletters or other short documents that required page-by-page design, Aldus's *PageMaker* was clearly the best bet. For business reports, manuals, and other lengthy standardized documents, you bought Xerox's *Ventura Publisher.* But by adding formatting styles and automatic text flow to *PageMaker 3.0*, Aldus has narrowed the gap between its electronic drafting table and Ventura's long-document approach. The upgrade's only faults are error-prone hyphenation and *PageMaker*'s perennially poor text editing.

Like *Ventura*'s tags, *PageMaker 3.0*'s styles let you instantly specify formatting for paragraphs, headlines, captions, and other text elements throughout a document. You can pick the typeface size and style, alignment, tabs, and so on—even the color of text. The process is simple: Select the text, click on a style listed on screen, and watch the text transform. Creating styles is easy enough, and changing them is as easy as with *Ventura*.

Desktop publishers on deadline will appreciate *PageMaker 3.0*'s ability to quickly typeset word processed files. The program reads style names embedded at the beginning of each paragraph of a text file and assigns *PageMaker* styles to tagged elements once they're imported. *PageMaker* could always read text and a limited number of attributes (such as boldfacing and tabs) from such pop-

ular word processors as *WordPerfect 4.2* and *WordStar 3.3*. Aldus is now developing a series of installable "filters," which import and export entire word processing style sheets. A filter for *Microsoft Word* comes with *PageMaker 3.0;* one for *WordPerfect 5.0* was nearly ready at press time.

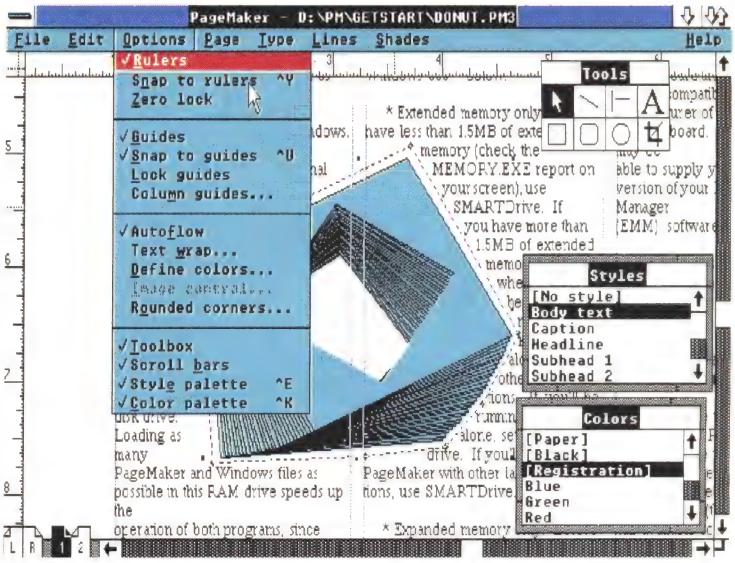
Autoflow, *PageMaker 3.0*'s second major enhancement, pours text from first page to last and adds any necessary extra pages automatically. No more dragging text around images or pushing it from one page to the next; text adroitly sidesteps any graphic element that's in the way, flows *through* images, or neatly fits around irregularly shaped graphics. (There is still no way to anchor text to graphics, however.)

If you're a designer, you'll welcome *PageMaker*'s spot-color support and scanned-image control. You can mix, name, and apply colors to any element on the page, then print the result on a Hewlett-Packard PaintJet color printer or as black-and-white separations with registration marks, ready for offset printing.

PageMaker's new image controls are just as impressive. From the image control menu, you adjust the contrast and brightness of a selected scanned or bit-mapped image by clicking on a graded scroll box. From the same dialog box, you can select halftone or line screens to superimpose over the original image.

For type hounds, Aldus has bundled Bitstream's *Fontware* font generation program, along with ten scalable typeface outlines in four families. Using the outlines, *Fontware* generates typefaces for both PostScript- and LaserJet-compatible printers in hundredth-of-a-point increments from 6 to 72 points.

Combined with *PageMaker*'s standard kerning and spacing controls, version 3.0 would satisfy the most exacting desktop typographers but for one serious pitfall: error-prone hyphenation. The program's algorithm/dictionary combination handles (or declines) most breaks correctly, but goofs inexcusably on such common words as *service* and *everyone*.



PageMaker 3.0's new spot-color and text-wrapping abilities extend the program's lead over Ventura Publisher in graphics handling.

And an old problem, *PageMaker*'s lack of text-processing functions, persists. The program still doesn't offer search and replace, automatic indexing, table of contents generation, or footnoting. On the other hand, Aldus deserves a gold star for *PageMaker*'s newly acquired ability to directly import, format, and align *1-2-3* and *Symphony* worksheets and *dBASE* files.

For desktop publishers who can't live without automatic indexing, table of contents generation, and footnotes, *Ventura Publisher* is still essential. But if you produce both short, design-intensive pieces *and* long text documents, *PageMaker 3.0* has become a very attractive choice. —*Luther Sperberg*

WHERE TO BUY

PageMaker 3.0
Aldus Corp.
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List price: $795; upgrade from 1.0 $95; free if version 1.0a was bought after November 2, 1987
Requirements: 640K, hard disk, mouse, graphics card, DOS 3.10 or later version
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Technical support: 45 days free, no

toll-free number, M–F 7–6; extended support $100 per year (includes free or discounted upgrades, 5 hours toll-free phone support)
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For more information, see Products Featured in This Issue.

Draw Applause 1.0

Business graphics package

PROS: Easy to use, good charting and drawing tools, excellent color slide capabilities

CONS: Limited 3-D options, RAM hungry

When Ashton-Tate released *Draw Applause*, it not only upgraded *Chart Master* but also challenged such powerful graphics packages as *Freelance Plus* and *Harvard Graphics* (see "Business Graphics Roundup," *PCW*, July 1988). *Applause* has solid charting and drawing tools and an innovative interface, but the package's real strength lies in such high-end color capabilities as a vast palette and sophisticated color shading.

Applause's mix of features includes VGA support, zoom and slide-show options, and a generous clip-art library. The program lets you easily create text, superimpose charts over complete images, and revise free-form objects. Moreover, *Applause* is fun to use. You rarely need to worry about backing out of a menu, undoing an undo, or losing control of an object you've temporarily hidden behind another object. On the downside, the current version requires 580K of RAM and offers neither bus mouse nor PostScript support. Ashton-Tate says an August upgrade needs only 512K of RAM and supports the bus mouse; a free PostScript driver is available from the company's customer support department.

Applause combines a solid selection of basic chart types—bar, line, area, pie, tabular, and mixed—with a number of handy editing features. You can assign distinct colors to individual elements of a chart, place labels inside or outside chart elements, and size a chart so it fits neatly into *Applause*'s Drawing window.

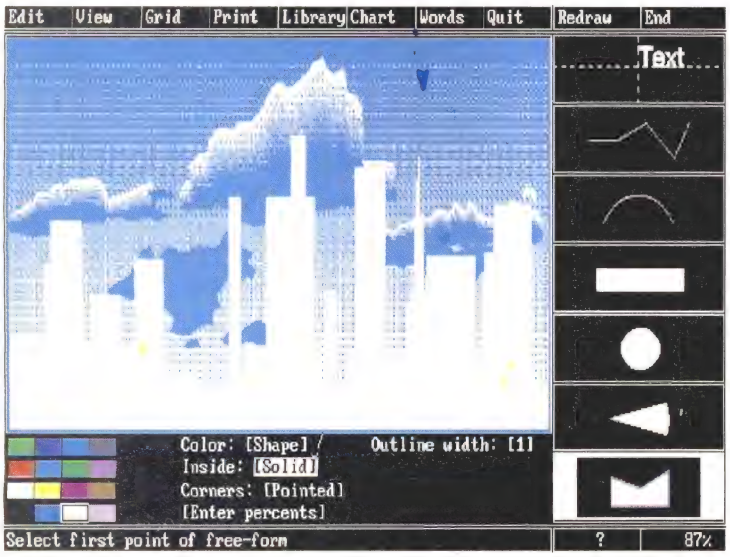
In *Applause*'s Word Chart window, you can whip up text charts in nothing flat. This window comes with eight standard text layouts, which you can complement with 40 custom layouts. To enhance text, you can use rule, box, and drop-shadow options in all fonts (which range in size from 1 to 20 points). An automatic spacing option adjusts the amount of space between text lines. Text placement is also automatic, with options for vertical placement, centering, and right and left alignment.

While no match for *Freelance Plus* in data importing, *Applause* lets you key data into an 11-column-by-151-row data entry screen or import .DIF or .WK1 (but not .WKS) files. And *Applause* exports images in CGM (Computer Graphic Metafile) files, which can be read by *Ventura Publisher* and *PageMaker*. Finally, Ashton-Tate has thrown a lifeline to a group of users long isolated by incompatible file formats: a free translation utility lets *Applause* read files generated by Ashton-Tate's *Master Graphics* packages.

Compared to *Harvard Graphics*, *Applause*'s drawing talents are especially noteworthy. For example, you can copy an image up to 33 times to create a staggered depth effect and manipulate points in an existing object at lightning speed.

If you like menu choices close at hand rather than in pulldown menus, you'll like *Applause*'s main drawing screen. It's bor-

(continues)



Thanks to Draw Applause's graduated-color option, you can shade one hue into another, as in these clouds.

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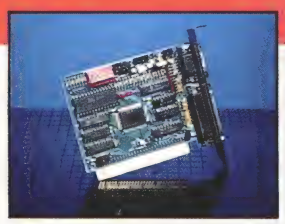

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FEATURES EVALUATION

Draw Applause: Master of Color

Ashton-Tate's outstanding package offers features to match those of Harvard Graphics and Freelance Plus.

● Yes
○ No
◒ Deficient

	Draw Applause 1.0	Harvard Graphics 2.1	Freelance Plus 2.0
Bar graphs			
Vertical/horizontal bar	●	●	●
Maximum data sets per clustered bar graph	10	8	8
Overlapped bars	◒[1]	●	○
3-D bars	●	●	○
Pictographs	●	○	○
Bar/line graphs	●	●	○
Step graphs	○	●	○
Change bar width/spacing	●	●	○
Pie charts			
Maximum slices per pie	16	12	16
Maximum exploded slices	16	12	16
Two- or four-pie charts	◒[1]	●	●
Proportional pie charts	○	●	○
3-D pie charts	●	●	○
Line graphs			
Scatter plots	○	●	●
Maximum line types	2	4	8
Maximum line markers	0	13	9
Maximum data points per line	150	240	120
Maximum data sets per line graph	10	8	8
Area graphs	●	●	○
Other graph types			
High/low/close	○	●	○
Bubble charts	○	○	○
Gantt charts	○	○	○
Word graphs	●	●	●
Free-form graphics			
Free-form lines/shapes	●	●	●
Maximum selectable patterns	7	12	15
Ellipses and arcs	●	●	●
Straight/rounded rectangles	●	●	●
Other geometric elements	●	●	◒[2]
Select all elements	●	●	●
Copy/move elements between files	●	◒[3]	●

	Draw Applause 1.0	Harvard Graphics 2.1	Freelance Plus 2.0
Free-form graphics			
Flip/rotate objects	●	○	●
Undo command	●	●	●
Zoom feature	●	○	●
Rulers/grids	●	●	●
Data import			
Reads ASCII	○	●	●
Reads .WKS, .WK1	◒[4]	●	●
Reads .PIC	○	○	●
Reads dBASE	○	○	●
Reads Metafile	●	◒[1]	●
Reads .DIF	●	○	●
Miscellaneous			
Multiple typefaces and sizes	●	●	●
Slide-show feature	●	●	○
Borders or frames	●	●	●
Macro capabilities	○	●	○
Device support			
Mouse	●	●	●
PostScript driver	◒[5]	●	●
HP LaserJet Plus	●	●	●
HP HPGL—compatible plotters	●	●	●
Xerox 4020 color printer	●	●	●
Polaroid Palette	○	●	●
Polaroid Palette Plus	○	●	○
Epson dot matrix printers			
EX	●	●	○
FX	●	●	●
JX	○	●	○
LQ	○	●	○
LX	○	●	○
MX	○	●	●
RX	●	●	●

[1] Separate utility required.
[2] Available with clip art library.
[3] User must merge saved images on screen.
[4] .WK1 only.
[5] Driver available from company.

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1986,1987

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Insid

dered on two sides by menus and graphic icons that correspond to text, lines, arcs, rectangles, circles, wedges, and polygons. Selecting an icon displays an option panel from which you can pick a color, a fill pattern, and an outline width or summon context-sensitive help.

When it comes to generating color slides, *Applause* matches the more specialized *35mm Express* and is far easier to use than dedicated graphic art tools like Zenographics' *Mirage*. Some *Applause* options are irresistible: Using graduated color, for example, you can create an image of a cloud that subtly shades from light gray to blue. The 64-color EGA and VGA palettes display 16 colors on screen simultaneously—from lavender to camouflage green—and dithering can expand the range to 1024 hues. If the program's five predefined palettes don't suit your taste, you can define up to 43 additional ones. *Applause*'s built-in communications option makes it easy to transmit images to the Ashton-Tate Graphic Service (which is actually MAGICorp, the same vendor that handles *35mm Express*).

Applause supports an acceptable mix of printers, including Hewlett-Packard and Xerox laser printers and such plotters as the HP ColorPro. A batch print mode lets you print up to 99 images at a sitting. But *Applause*'s lack of PostScript support is a major lapse.

In *Applause*, Ashton-Tate has created a well-rounded graphics package that combines ease of use and strong drawing and slide-producing capabilities. If you've ever wished *Harvard Graphics* could draw or *35mm Express* weren't so focused on slides, take a look at *Applause*. —*Alan Southerton*

WHERE TO BUY

Draw Applause 1.0
Ashton-Tate Graphics Products
1000 Bridgeport Ave.
Shelton, CT 06484
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List price: $495
Requirements: 640K; hard disk (1.3MB disk space required); EGA, PGC, VGA, or Vermont Micro Systems controller (and compatible monitor); DOS 2.10 or later version
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Manuscript 2.0

Word processor

PROS: Well-integrated outliner, style sheets, formatting features

CONS: Hard to learn, awkward basic editing commands, slow

When Lotus first released *Manuscript 1.0* in 1986, people found its outline-based structure and document preview feature intriguing but didn't like the program's complex interface and lack of advanced editing tools. Thanks to an arsenal of new editing features—including excellent graphics import capabilities—*Manuscript 2.0* should grow beyond its limited popularity as a word processor for scientific and technical documentation.

Lotus has given *Manuscript* so many new features, it's hard to list them all. Version 2.0 offers macros, boilerplate libraries, and a thesaurus, and its cumbersome spelling checker has been improved. The program automatically updates *1-2-3* and *Symphony* worksheets and offers batch printing, improved footnoting, hyphenation, and header and footer routines. Other noteworthy additions include snaking columns, conditional mail merge, and style-sheet tags. And for good measure, Lotus tossed in automatic worksheet updating and excellent indexing, footnoting, and table layout features.

With its function keys, hot keys, and a *1-2-3*-like menu bar, *Manuscript*'s interface is largely unchanged, and the program is still a bear to learn. To ease the way, Lotus has im-

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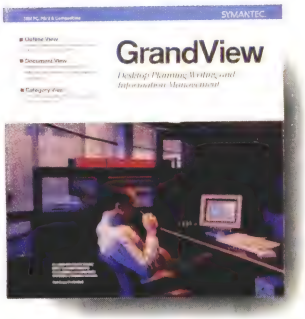

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□True BASIC 2.03 *(now includes Runtime)* . . 57.
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Vericomp ... NCP
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⊙SoftBytes 386 2.53 . . . . . 49.
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⊙WordPerfect Library 2.0. . . . . 69.
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⊙Zork Trilogy . . . . . 33.
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proved the menus, enriched the help system, and replaced embedded backslash commands with markers that you choose from a menu.

Manuscript's file management has been streamlined with a temporary exit to DOS, an automatic save function, and document summaries that display and sort files by size, date, and name. Version 2.0 beefs up file conversion with enhanced DCA support, graphics support that includes PostScript and TIFF files, and conversions for leading scanners, paint programs, and CAD packages.

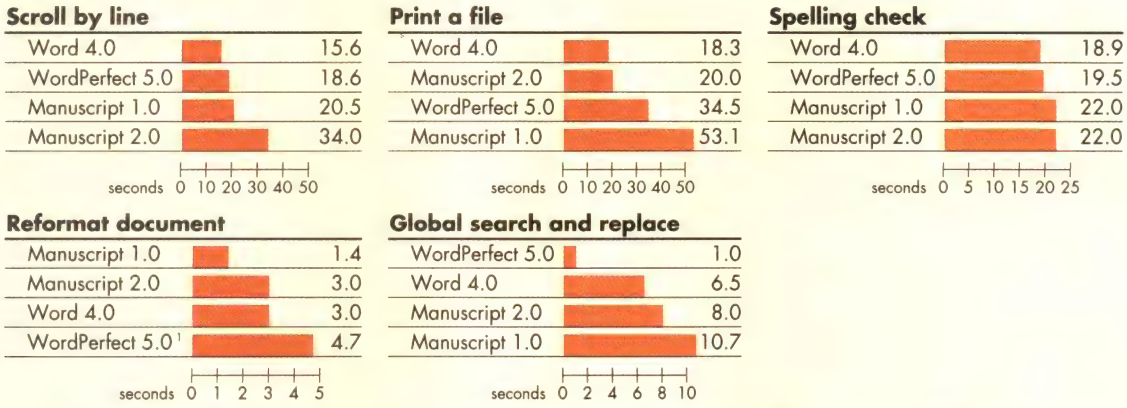
Without changing *Manuscript*'s hierarchical approach to formatting, Lotus has added a "named block" feature (similar to *Microsoft Word*'s style-sheet tags) that will better accommodate documents with diverse formats. *Manuscript 2.0* supports up to nine snaking columns, and you can balance the columns to fill out a page by automatically adding space between lines, blocks, and sections. You can also float graphics, tables, and white space, or tie them to the surrounding text.

Manuscript's widely imitated previewing function is now streamlined with menus. You can jump to a page, switch to half-page magnification, zoom in on a graphic, and greek text for faster screen refresh. Moving in and out of preview mode is still somewhat slow, but you can preview specific blocks, sections, graphics, and equations separately. One of the most welcome new editing features is a well-implemented macro function that re-

NSTL TEST REPORT

Manuscript 2.0

Though its features are much improved, Manuscript 2.0 generally runs slower than Word 4.0 and WordPerfect 5.0, and sometimes slower than version 1.0.



[1] These results measure the time required to issue the reformatting command and move to the end of the document. This command sequence compensates for WordPerfect's background reformatting.

All benchmarks were performed on an 8-MHz IBM AT with 640K and a 30MB hard disk running under DOS 3.20. All tests except the spelling check used an 8-page (480-line) text file consisting of groups of 4 characters separated by spaces (e.g., *aaaa bbbb cccc*). The file was formatted at 60 lines per page, with margins set at 1 and 60. A carriage return and blank line followed every 9 lines of text. This pattern was repeated throughout the document. Times were measured from the keystroke initiating the test until control was returned to the user.

Scroll by line
This test measured the time required to scroll line by line from the top of the file to the end, and from the end of the file back to the top. The two times were then averaged. A program was run to set the keyboard to generate 30 keystrokes per second. Without the use of such a program, all of the times would have been greater.

Reformat document
The times to reformat the document after changing the right margin from 60 to 50, and then from 50 to 60, were averaged for each program.

Print a file
This benchmark used a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement. The performance text file was "printed" to the device at the maximum speed supported by the program. Times with an actual printer would be greater.

Global search and replace
With the cursor positioned at the beginning of the text file, the program was instructed to automatically replace all (240) instances of *aaaa* with *AAAA*.

Spelling check
This benchmark recorded the time a program's spelling checker required to proof a 28,051-character ASCII file (consisting of 30 paragraphs of 14 lines each) after the file had been read into each program and saved in that program's format.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

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Inboard 386/PC w/1 Meg . . . . . $969.
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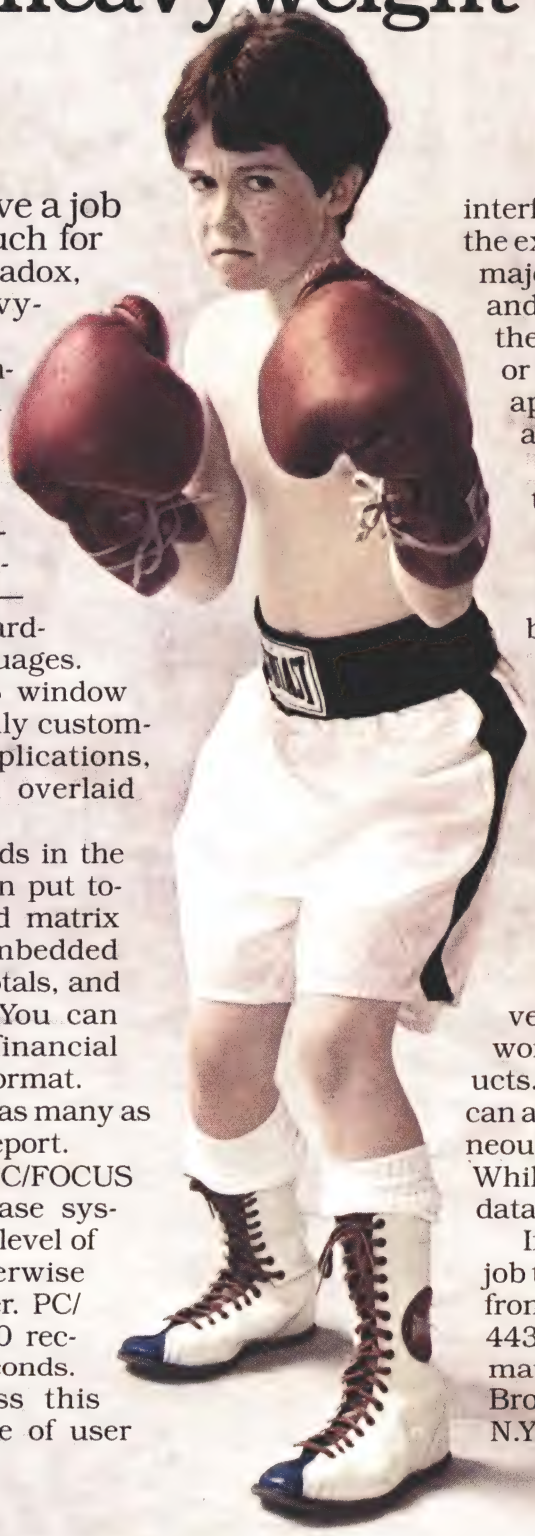

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PC/FOCUS includes modules for graphics, statistics, and communications. And there are optional modules including EQL—an English language interface, spreadsheets with goal-seeking capabilities, and interfaces to dBASE and other PC database systems.

There's also a MultiUser version of PC/FOCUS that works with the major LAN products. In a network, up to 32 users can access one database simultaneously without record lockup. While PC/FOCUS maintains your data integrity.

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PC/FOCUS
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Circle 259 on reader service card

cords and plays back keystroke sequences. Although there is no macro programming language, you can nest and edit macros. A new Library function stores boilerplate text that you can insert with a few keystrokes.

For all the improvements, *Manuscript 2.0* retains some failings. You still can't delete by line, sentence, or paragraph, for example, and the commands for deleting to the end or beginning of a line are so cumbersome that you might as well cut and paste. The program may be a whiz at formatting, but it's merely adequate for everyday text editing. And *Manuscript 2.0* is somewhat slower than *Word* and *WordPerfect*—and sometimes slower than version 1.0.

Those who dismissed *Manuscript 1.0* as interesting but incomplete should take another look. The program is still perfect for technical documentation, and version 2.0's numerous editing features considerably expand its scope. If your formatting needs are simple and training time is short, go elsewhere. But if you want an office word processor that handles long, complex documents, *Manuscript 2.0* is highly recommended. —*Eric Brown*

WHERE TO BUY

Manuscript 2.0
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500
List price: $495, upgrade from version 1.0 $75
Requirements: 512K (640K recommended), hard disk, graphics adapter for document preview
Not copy protected
Technical support: unlimited, no toll-free number, M–F 8:30–8
Other support services: 90-day limited warranty; extended support free for first six months, then $150 per year (includes toll-free technical support hot line, quarterly newsletter, support guide, demo disks for other Lotus products); training kit $350; authorized training centers nationwide; CompuServe Lotus "B" Forum (GO LOTUSB)
For more information, see Products Featured in This Issue.

DataPerfect 2.0

Data management program

PROS: Menu-driven, good data validation and reporting, requires just 192K of RAM, integrates well with other WordPerfect products

CONS: Slow; confusing terminology; awkward data entry; must export data to edit files or change field structure; expensive

When WordPerfect Corporation released its first data management package early this year, the company's fans may have wished it had stuck to word processing. A $595 quasi-relational program, *DataPerfect* links files in a variety of ways, offers good data validation and reporting, and works well with *WordPerfect* and its *Library* shell. However, maintaining the data base is cumbersome, and *DataPerfect* lacks an application generator and a programming language. Finally, as NSTL tests show, it runs very slowly.

DataPerfect requires only 192K of RAM, but it is awkward to install and its select-and-do, function-key rhythm takes getting used to. To data base vets, *DataPerfect*'s nomenclature will also seem strange: Instead of files, the program uses "panels" (three-part entities that comprise a data file, an index file, and a structure file), which are linked with "doors" and "doorways." *DataPerfect* permits an adequate 80 files per data base and 80 fields per file; a panel is also a data entry template, however, and there's only one screen form per panel.

Once you master *DataPerfect*'s vocabulary, defining a data base is straightforward enough. Linking files is also easy, and *DataPerfect* allows one-to-one, one-to-many, many-to-one, and many-to-many relationships, provided all related files have a common field. But because *DataPerfect* stores data in structured files rather than using the flexible table format of a *Paradox*, trouble begins when you add or delete a field or change a field type.

You must first go to *DataPerfect*'s Report/Export menu and export the data file. With cursor control still inside *DataPerfect*'s menu, you delete all records in the panel and redefine the fields. When you import the saved data file back, *DataPerfect* changes

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PC Digest is our comparative ratings report on IBM-compatible PCs and peripherals. It's the *authoritative* source for objective, scientific hardware evaluations.

Granted, this unusual publication is not for everyone. But if you need to go *beyond* the ads and the reviews...if you require a *deeper level of analysis*...if your work calls for *complete* and *systematic* data to guide your buying decisions...then *PC Digest* is the only place to turn.

The ultimate hardware reference tool.

Today, the PC marketplace is more crowded and confused than *ever* before.

PC Digest evaluates a wide range of PCs and peripherals.

How can you be *certain* a piece of equipment will prove reliable? That it will do all it claims? That it will be compatible with your existing system? How can you make truly *informed* buying decisions?

There's only one *sure* way to evaluate the hundreds of competitive products. They must be *tested*. Head-to-head. Feature by feature. Against precise, scientific benchmarks. Performing real-world business tasks.

Only *PC Digest* performs this exacting research process. There is no other resource that even comes close.

Every major PC and peripheral is evaluated.

New equipment is a major investment. And, for most organizations, buying PCs and peripherals is a *continuous* process — not a one-time event.

Skilled engineers spend weeks methodically testing each piece of equipment.

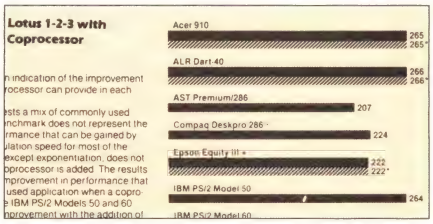
PC Digest can help you make the *right* decisions — and *avoid* expensive mistakes. Arriving each month, it's an *ongoing* reference source for a wide range of products. For example:

✓IBM and compatible 286 and 386 machines ✓Laptops ✓Modems ✓Laser printers Backup systems ✓VGA boards ✓Monitors ✓Network adapters ✓Memory expansion cards ✓Disk drives ✓Hard disk cards ✓Other mass storage devices ✓Accelerator boards ✓Dot-matrix printers ✓Co-processors ✓Scanners ✓And more

For each product, we determine: How easy is it to set up? What are its features and capabilities? What special system requirements are necessary? How well does it work with major business software? How fast does it perform typical tasks? How good is the documentation? How does it function under DOS and OS/2?

We tell you which products are *best* — and which have *problems*. And we make *specific recommendations* based on the hard data our tests uncover. (Specifications and prices are included.)

Users applaud *PC Digest*'s graphic format. Test results are clear, readable and accessible. Quick-reading charts show how products stack up against each other.



Benchmark test results show how each product scored while running major business software programs.

Couldn't the concrete, research-based data supplied *only* by *PC Digest* help you improve your product selection decisions — and save you time, money and hassles?

Objective, scientific testing standards.

Why is *PC Digest* so widely used — and so highly regarded?

For a start, no one else can equal NSTL's resources. Our laboratory facilities are state-of-the-art. Our staff of skilled engineers and technicians draws upon a wealth of "hands-on" experience that can be gained only by scientifically testing PC products day after day.

PC World announces an innovative partnership.

"*PC World* has entered into an unprecedented arrangement to have our review process conducted by National Software Testing Laboratories.... NSTL has the reputation for undertaking the most comprehensive performance and versatility tests of software and hardware products in our industry....They're going to *tell* it like it is — not *sell* it like it is."

— **David Bunnell,** Chairman

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— **Richard Landry,** Editor

"*PC World* is proud to include benchmarks and evaluations from the industry's leading source of unbiased product information....NSTL has earned a reputation as the Underwriters Laboratories of the PC industry. Renowned for its exacting, objective methodology, [its] solid reputation has been built by a staff as fastidious as a team of wary tax auditors."

— **Eric Knorr,** Senior Associate Editor

go to test equipment?

testing lab.

Performance tests are *applications-based.* We test machines with popular software such as the major spreadsheet and database programs. In contrast, many magazine reviews use misleading "raw processing" benchmarks that bear little relation to real-world business tasks. And the loose-leaf data services, despite their imposing appearance, perform *no* testing at all.

PC Digest is fiercely independent. We have a firm policy of accepting *no ads.* That gives us the freedom to be *fully objective and unbiased* in our product evaluations.

Without vested interests of any kind, we can be *totally* impartial. We're free to print *exactly* what our tests reveal — and we don't pull our punches.

Monthly "Buyer's Alert" keeps you on top.

Selecting equipment is a never-ending process. That's why *PC Digest* monitors the fast-changing PC marketplace on an *ongoing* basis. It keeps you a jump *ahead* of events.

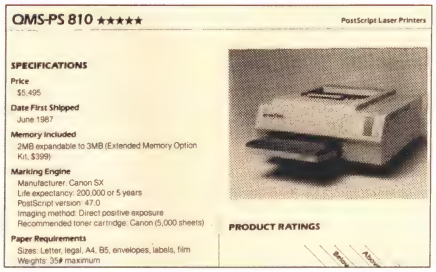
So it's not surprising that *PC Digest* frequently "scoops" the computer industry press. With the *first* comprehensive benchmark tests of IBM's PS/2 line. The *first* tests of the Compaq and IBM 25MHz PCs. And the *first* tests of OS/2's multitasking abilities.

ACCELERATOR BOARD FEATURES	Breakthru 286	Fastcache 286	Inboard 386	Match 10	PC turbo 286c-10	Raccard 286	SpeedPac
Speeds up IBM PC-1	Y	Y	N	Y	Y	Y,R	Y	N
Speeds up IBM/XT	Y	Y	N	Y	Y	Y	Y	Y
Speeds up IBM/AT	N	N	Y	N	N	N	N	N
Microprocessor	80286	80286	80386	8086	80286	80286	80286	80
Memory Cache	16K	8K	64K	8K	N	8K	8K	12
On-board memory	N	N	OP1	N	1024K	N	N	N
Computer processor retained	N	Y	N	N	Y	N	N	N
Change Speed	Y,S	Y,S	Y,S	Y,E	Y,S	Y,I	Y,I	Y
Change speed without rebooting	Y,S	N	Y,S	Y,E	Y,S	N	N	Y
Change speed within application	N	Y,K	Y,K	N	N	N	N	N
Disk caching included	Y	Y	N	N	Y	N	N	Y
RAM disk included	N	Y	N	N	Y	N	N	Y
Print spooler included	N	Y	N	N	Y	N	N	Y
Long/short card	SH	SH	L	L	L	SH	SH	

Which products have the capabilities you want? Our technicians verify each feature.

Each issue includes *Buyer's Alert.* This useful monthly newsletter previews new products and new models...forecasts technology changes and trends...gives you an inside look at vendor policy changes...and much more.

An important plus: With *PC Digest,* everything you need to know is in *one* place. So you don't have to plow through stacks of material searching for the answers you need.



Each product receives its own detailed report.

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Technology is proliferating at dizzying speed. Networking is reshaping the way business functions. The 386 systems and OS/2 will create tough new price/performance decisions.

Expect more competing vendor claims and more hype. New compatibility problems. Product shortages and price increases. In sum, more *confusion* than ever before!

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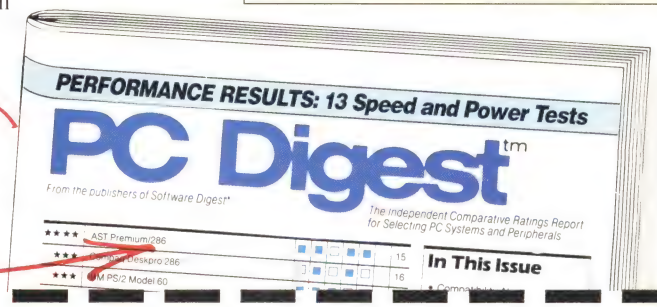

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NSTL TEST REPORT

DataPerfect 2.0

DataPerfect finds single records quickly, but it lags way behind flat-file Q&A and menu-driven relational DataEase in other operations.

DataEase 2.5 release 3, DataPerfect 2.0, and Q&A 3.0 were tested on an 8-MHz IBM AT Model 339 with 640K, a 30MB hard disk, and DOS 3.20.

Average individual record search
Two records at different locations in two 10,000-record files were selected one at a time. The times for the two searches were then averaged.

Group record search with an index
Groups of 100 records at different locations in two 10,000-record files were selected on the indexed field using relational operators to establish the selection limits. The selected records were sorted in ascending order, and a long (50-character) field was output to a null printer.

Report with two-level sorting
Three fields were printed from all of the records in the 10,000-record file. The records were sorted with an indexed field as the primary key and a nonindexed field as the secondary key. The report was output to a null printer.

Group record search without an index
From different locations in two 10,000-record files, groups of 100 records were selected on a nonindexed field (using relational operators to establish the selection criteria). The records were sorted in ascending order, and a long field was output to a null printer.

Data based on tests designed and conducted at National Software Testing Laboratories (NSTL). All rights reserved.

each record according to the new definitions. Contrast this awkward process with the point-and-shoot editing used by *Q&A*.

Note, however, that *DataPerfect* packs several potent features: Data validation is especially thorough and can use the formula language to test fields. All Boolean operators are available for searches, as are nested conditionals and a CASE statement. Reporting is also strong: *DataPerfect* comes with six short report formats, including columnar, delimited ASCII, and *WordPerfect* merge formats, and you can define and save up to 150 custom reports. You can even define report selections that depend on formulas, conditionals, and variables—no mean feat for a program that lacks a command line and a macro language.

Used in conjunction with *WordPerfect* and *Library*, *DataPerfect* can access even more formatting and presentation tools, along with a macro language that combines operations from all three programs. And therein lies the package's obvious—and perhaps only—niche. If you already use Orem's offerings, *DataPerfect* is an acceptable, if expensive, adjunct. Otherwise, *Q&A* is a cheaper and classier choice at the low end, and *DataEase* or *Advanced Revelation* at the high.
—*Marlene Nesary*

WHERE TO BUY

DataPerfect 2.0
WordPerfect Corp.
288 W. Center St.
Orem, Utah 84057
801/225-5000
List price: $595
Requirements: 192K, DOS 2.00 or later version
Not copy protected
Technical support: unlimited, toll-free number, M–F 6:30 a.m.–8:30 p.m.
Other support services: newsletter $36 per year
For more information, see Products Featured in This Issue.

Forecast Pro

Statistical forecasting program

PROS: Sophisticated forecasting methodologies, handy built-in expert system

CONS: Awkward installation and data entry, limited choice of methodologies, sketchy documentation

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80287-8/80287-10	$289/$339
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35	Period	Forecast	Lower (95%)	Upper (95%)
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37	2-1961	432.000000	339.222222	524.777778
38	3-1961	432.000000	318.370892	545.629108
39	4-1961	432.000000	300.792408	563.207592
40	5-1961	432.000000	285.305453	578.694547
41	6-1961	432.000000	271.304175	592.695825
42	7-1961	432.000000	258.428671	605.571329
43	8-1961	432.000000	246.444444	617.555556
44	9-1961	432.000000	235.188612	628.811388
45	10-1961	432.000000	224.542582	639.457418
46	11-1961	432.000000	214.416824	649.583176
47	12-1961	432.000000	204.741785	659.258215

Cursor keys: Scroll <CR>: Proceed <ESC>: Exit.

Forecast Pro graphs data within the program but yields only a table of numbers when printed out.

ple, deducing from experience how seasonal temperature fluctuations, income tax refunds, or holidays will affect demand for products can help a company plan for future demand without over- or underproducing. With a program like Business Forecast Systems' $495 *Forecast Pro*, even a small business can use historical data to accurately project future product, staffing, and service needs.

Thanks to an ingenious built-in expert system, menu-driven *Forecast Pro* guides managers and other nonstatisticians from initial analysis of data through model development and final forecast.

Having said that, it's too bad that this generally well-designed program has a number of annoying shortcomings. Installing *Forecast Pro* is a chore, as is entering data. And while *Forecast Pro* offers exponential smoothing, Box-Jenkins, and stepwise multiple regression, it lacks robust decomposition and adaptive filtering methodologies.

Getting started is the most tedious part of *Forecast Pro*. Installation instructions are scattered, and such simple operations as selecting forecast variables are difficult. Entering data is irksome as well; the program lets you enter values for only one variable at a time. The solution: Enter values in a word processing file or *1-2-3* worksheet and import the data into *Forecast Pro* as an ASCII or .PRN file.

For nonexperts, the program's main attraction is its rule-based expert system. It examines raw cyclical or seasonal data, factors in random fluctuations, and suggests the most appropriate forecasting technique for your data. As you refine the chosen model, *Forecast Pro* maintains an audit-trail text file of the process and recommends ways to better fit the model to your data. Finally, you specify how far into the future you would like the program to forecast, then print the forecast to disk or to a printer.

Despite its disjointed documentation and limited selection of forecasting methodologies, *Forecast Pro* compares favorably with such competitors as *Forecast Plus*, *Wisard Professional*, and *SmartForecast II*. For companies that want forecasting—but not the trouble and expense of doing it on a mainframe—*Forecast Pro* can improve the chances for a better bottom line. —*Phillip Good*

WHERE TO BUY

Forecast Pro
Business Forecast Systems
55 Wheeler St.
Cambridge, MA 02138
617/354-3745
List price: $495
Requirements: 256K, two disk drives (hard disk and math coprocessor recommended), DOS 2.00 or later version
Not copy protected
Technical support: unlimited, no toll-free number, M–F 9–5
Other support services: user BBS, quarterly newsletter free to registered users
For more information, see Products Featured in This Issue.

Luther Sperberg is a freelance writer and desktop publishing trainer in New York City. Alan Southerton is a senior technical writer for Progress Software in Bedford, Massachusetts. Eric Brown is a contributing editor for PC World. *Marlene Nesary is an assistant editor for* PC World. *Phillip Good is the editor and publisher of* The Annual Report on Statistical Software *in La Cañada, California.* ●

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RampagePlus 286	AT or Com-patible (XT form factor)	up to 8 MB	EMS 4.0 EEMS EMS 3.2 OS/2	Serial/ Serial or Serial/ Parallel

By making the one simple decision to buy RampagePlus, you can postpone making a lot of other decisions. If you're asking yourself: Do I need the extra functionality of EMS 4.0? Should I plan on converting to OS/2? Can I get the same power from my AT compatible as I can with a PS/2? Will I need to save slots for input/output boards? RampagePlus takes care of it all.

Of course, you'll be going on a Rampage designed by AST. That makes your decision even easier. After all, year after year, we've sold more memory/multifunction boards than any other company. Great boards, like SixPakPlus® and Advantage.® And, after selling over three million boards, we're proud to say the RampagePlus boards are the best we've ever built.

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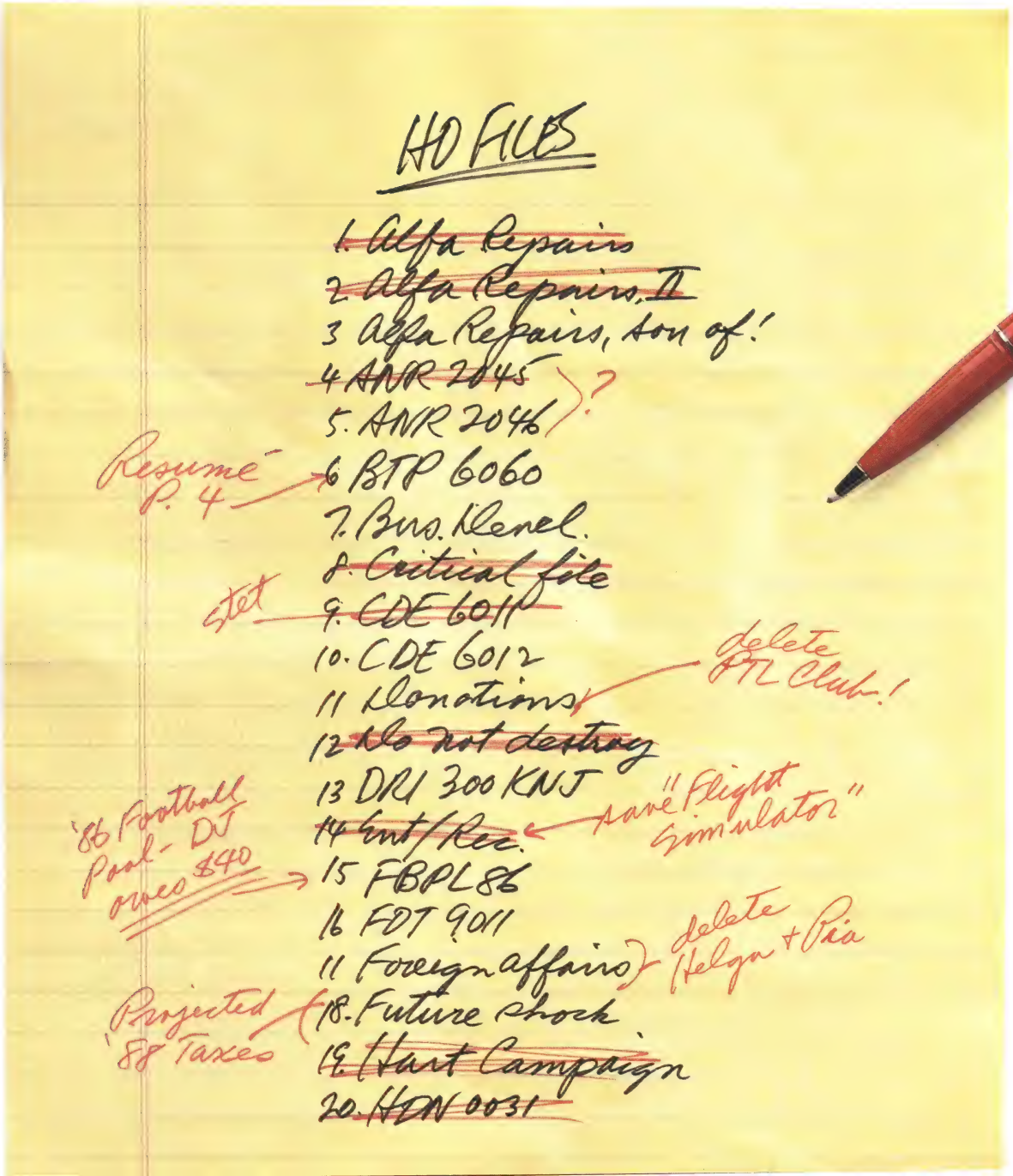
Circle 53 on reader service card

The agony of delete.



9:34 Tuesday night. You're working on a report that's going to top 80 pages. It's got charts, graphs, database files from the company mainframe, it's a monster.

About halfway through, you decide to make a backup file so you can tweak the original without losing it. And up comes a familiar message.

Your hard disk has 75K left. And you need at least 220K.

At this point, the next hour gets very predictable. You pull up the directories, looking for files to delete. Which isn't all that simple. Did ANR 2046 replace ANR 2045, or do you still need both of them? And then there's your resume. Did you put it at the back of BTP 6060 or somewhere else?

The only way is to browse those files one at a time, and delete the ones you can. Which can definitely affect the mood of the evening.

Worse yet, when your drive gets that full, you have to go through the whole exercise at least once a month. Until you do something about it.

But now, there's a clean, simple way to end this nightmare. Plus Hardcard.™ It's a 40 MB hard disk on a 1" card. And it fits in a single slot. So you won't have to throw out your old drive to make room.

With Hardcard, you get a full 40 MB of fresh new storage. Meaning you get to keep the files on your original disk.

Even if you've never had the back of your PC off before, you can install Hardcard in no time flat. There are no connector cables. No adapter cards. And you won't have to buy a new power supply.

Since Hardcard is engineered so lean and tight, it uses less power than ordinary hard disk drives. And lasts two to four times longer. It even leaves the rest of your PC open for turboboards, graphics cards, or whatever.

Plus Hardcard. It comes in 20 and 40 MB versions for the IBM® PC, XT,™ and AT® computers, and compatibles. Even for the new Personal System/2,™ Models 25 and 30. So if you've spent one too many nights cleaning up old files, just ask your computer dealer for a Hardcard demonstration. Or call (800) 826-8022 for the dealer nearest you.

And get ready for the thrill of victory. Which sure beats the agony of delete.

Plus™ Hardcard™

Plus Development Corp
is a subsidiary of Quantum Corp

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Circle 141 on reader service card

WORLD CLASS AWARDS

THE READERS' CHOICE

WES NIHEI

JEFFREY ATHERTON

Part reader survey, part wish list, part raffle, the World Class Awards defies pigeonholing and packs a few surprises. One thing is certain: PC World readers know their hardware and software. This year, the sixth annual World Class contest showcases a collection of 35 software and hardware products worth over $30,000, handpicked by our readers.

Not surprisingly, readers played the favorites as far as software was concerned and bet the house on more powerful hardware from established vendors. With the exception of Intel and Epson, all of last year's winning hardware manufacturers took top honors this year, many with updated versions of their 1987 winners.

PC World congratulates those manufacturers whose products received the readers' seal of approval. Although these selections should not be construed as endorsements by PC World, they are a telling gauge of reader preference.

The tables on the following pages list the winning products plus those receiving a significant portion of the votes cast in each category. The Others category represents the combined percentage of all remaining products; the larger this number, the more products there were vying for the votes of PC World readers.

TOM WOLF/ONYX

Arthur Booth

THE WINNERS' CIRCLE

As always, three lucky readers were selected by random drawing from among the thousands of World Class Awards entrants for first, second, and third place prizes.

World Class goes to Washington, D.C., this year to award first prize to Arthur Booth. A project manager with the National Oceanic and Atmospheric Administration, Booth uses an IBM PC XT at work and an Eagle PC at home. He's a confirmed shareware supporter but is glad he can raise his sights, thanks to his new Compaq 386/20—the top-ranked desktop computer—and 33 other hardware and software products included in his World Class haul.

Stan Schowalter of Orange, California, pulls down second prize, a Compaq Portable 386. No stranger to powerhouse computing, Schowalter is the director of MIS for TRW mortgage document services. He uses an AST Premium/386 at the office, but his new Portable 386 will displace the Epson Equity II at home.

Third prize, a Toshiba T3100 laptop, goes to Virgil Swartzlander of Gibsonburg, Ohio. Swartzlander runs a public accounting business when he isn't fulfilling his duties as treasurer for Sandusky County, a post he's held for 30 years. He's a relative newcomer to personal computing, having purchased an IBM PC XT just two years ago so he could process clients' tax returns with *PC/Tax Cut*. What other applications does he use? None. "I didn't realize how good other software could be, but it looks like I'll be using a lot more now."

BLAKE LITTLE

Stan Schowalter

BRUCE ZAKE

Virgil Swartzlander

Big Blue's Blues, Compaq's Triumph

The Intel 80386's emergence this year as the processor of choice sways readers' choices for desktop and transportable computers. But IBM's trumpeting of its PS/2 line (including the 80386-based Model 80) fell on deaf ears. Readers overwhelmingly opted for the Compaq Deskpro 386/20 and pushed Compaq's Portable 386 to the top of the transportables heap.

Compaq's dominance in the transportables category is hardly a surprise, but the company has outdone itself in the desktop world, wresting the World Class title from IBM two years running, first with the 16-MHz Deskpro 386 and now with the 386/20. Has IBM lost touch with its customers? "The 386/20 has blazing speed, especially if you install a numeric coprocessor," says reader Brenton Drakeford, president of Las Colinas Computers in Irving, Texas. "It's the best-engineered piece of hardware I've seen, and I've used IBM, AT&T, and a fairly broad spectrum of other PCs. Every new Compaq machine is better than the last one."

The Toshiba T3100 and the Zenith Z-183 took the number one and two spots, respectively, in the laptop category, with the T3100 hanging on to first place for the second year in a row. But the ubiquitous 80386 made its presence felt, powering the Toshiba T5100 to a strong third place finish. In printers, IBM tasted defeat as former partner Epson rebounded from last year's second place showing to take first, second, third, and fourth with four dot matrix printers, led by the LQ-2500. Last year's winner, the IBM Proprinter, plummeted to sixth place.

In other hardware categories, readers chose to upgrade their favorites rather than switch brands. Hewlett-Packard, NEC, Video-7, and Plus Development once more won the laser printer, monitor, graphics board, and storage categories, respectively, each with new versions of last year's winners. Two notable surprises: The NEC LC890, an LED printer, took second among laser printers, supplanting the Apple LaserWriter as the top PostScript printer, and Intel's AboveBoard upset the perennial winner—AST Research's SixPakPlus—as the champion memory expansion board.

This year we also bid a fond farewell to IBM's XT and AT—two of the machines that started the revolution. In their place, fittingly, is the PS/2 Model 80, this year's most promising newcomer. Will the PS/2 be the one to inspire our readers' techno-lust next year? Stay tuned.

Keep-It-Simple Software

In choosing their software favorites, readers either stayed with the familiar or opted for new solutions that emphasized ease of use. Key examples: first-time winners *ProComm*, *Q&A*, and QuickBASIC. Not surprisingly, perennial winners such as *WordPerfect*, *1-2-3*, and *dBASE III Plus* remained kings of their respective hills—although not without challenges.

1-2-3 reigns as spreadsheet supreme, but new arrivals *Excel* and *Quattro* made strong showings despite having been on the market less than a year. *Excel*'s top-notch graphics and innovative features helped make it the most promising software newcomer and even earned it votes in the financial analysis category. "*Excel*'s built-in ability to produce sophisticated graphics makes the difference," says reader Bill Ibbs, professor of civil engineering at the University of California at Berkeley. "I've used *1-2-3* and *Quattro*, but people make decisions by looking at trends—not by looking at raw numbers."

Alex Stickney, assistant controller at the *Austin American-Statesman* in Austin, Texas, offers further testimony: "I don't require graphics; I chose *Excel* for its excellent worksheet-linking capability. It's difficult to compile data from different departments and create a high-level budget with *1-2-3*—a program I've used most of my career. But *Excel* can do it easily."

The success of *ProComm* is the best evidence that understandable, functional software will win out. A shareware communications package in the best tradition of *PC-Talk*, *ProComm* from Datastorm Technologies emerged from the world of shareware to knock *Crosstalk XVI* out of the World Class top spot and surpass *Smartcom II* and *III*. Apparently, an accessible interface and communications muscle make for an irresistible combination. Says World Class winner Arthur Booth, "*ProComm* is extremely easy to learn and use, but it's not limited. I can use it to maintain a bulletin board with ten co-workers spread out across the United States or access mainframe data for my projects." How successful might Datastorm's brainchild be? *ProComm Plus*, released as a retail product in January, finished fifth this year.

Expect more surprises in next year's World Class contest. OS/2, the new PS/2s, and 25-MHz 80386 systems may prove the catalysts for a new round of winners. But it takes more than potential to impress *PC World* readers—*HAL*, last year's most promising newcomer, mustered only a nominal repeat appearance in that category this year.

PC World thanks all the readers who took the time to share their opinions and invites everyone to take part again in 1989's contest. What new products will scale the World Class heights? You be the judge. ●

Wes Nihei is an assistant editor for PC World.

HARDWARE

DESKTOP COMPUTER

%	Product	Manufacturer
22	**Compaq Deskpro 386/20**	**Compaq Computer**
14	Compaq Deskpro 386	Compaq Computer
11	IBM PS/2 Model 80	IBM
5	AST Premium/286	AST Research
4	IBM PS/2 Model 50	IBM
44	Others	

83% of respondents voted in this category

TRANSPORTABLE COMPUTER

%	Product	Manufacturer
35	**Compaq Portable 386**	**Compaq Computer**
25	Compaq Portable III	Compaq Computer
16	Compaq Portable 386/20	Compaq Computer
5	Compaq Portable II	Compaq Computer
2	Toshiba T5100	Toshiba America
17	Others	

47% of respondents voted in this category

LAPTOP COMPUTER

%	Product	Manufacturer
20	**Toshiba T3100**	**Toshiba America**
14	Zenith Z-183	Zenith Data Systems
12	Toshiba T5100	Toshiba America
9	Toshiba T1000	Toshiba America
7	Toshiba T3200	Toshiba America
38	Others	

47% of respondents voted in this category

DOT MATRIX/NLQ PRINTER

%	Product	Manufacturer
8	**Epson LQ-2500**	**Epson America**
7	Epson FX-286e	Epson America
5	Epson LQ-1050	Epson America
4	Epson LQ-850	Epson America
4	Toshiba P351	Toshiba America
3	IBM Proprinter XL-24	IBM
69	Others	

71% of respondents voted in this category

All totals equal 100%.

MONITOR

%	Product	Manufacturer
13	**NEC MultiSync II**	**NEC**
12	NEC MultiSync	NEC
11	NEC MultiSync Plus	NEC
11	Zenith ZCM 1490	Zenith Data Systems
5	Princeton Ultrasync	Princeton Graphic Systems
48	Others	

59% of respondents voted in this category

LASER PRINTER

%	Product	Manufacturer
67	**HP LaserJet Series II**	**Hewlett-Packard**
8	NEC LC890	NEC
3	Apple LaserWriter	Apple
3	HP LaserJet	Hewlett-Packard
2	HP LaserJet Plus	Hewlett-Packard
17	Others	

52% of respondents voted in this category

MODEM

%	Product	Manufacturer
21	**Smartmodem 2400**	**Hayes Microcomputer Products**
12	Smartmodem 2400B	Hayes Microcomputer Products
11	V-series Smartmodem 9600	Hayes Microcomputer Products
8	Smartmodem 1200	Hayes Microcomputer Products
6	Smartmodem 1200B	Hayes Microcomputer Products
42	Others	

48% of respondents voted in this category

GRAPHICS BOARD

%	Product	Manufacturer
15	**Vega VGA**	**Video-7**
8	Vega Deluxe	Video-7
7	Hercules Graphics Card Plus	Hercules
4	IBM VGA 8514	IBM
3	EGA Wonder	ATI Technologies
63	Others	

36% of respondents voted in this category

INPUT DEVICE

%	Product	Manufacturer
37	**Microsoft Mouse**	**Microsoft Corp.**
28	Logitech C7 Mouse	Logitech
7	PC Mouse	Mouse Systems
2	HP ScanJet	Hewlett-Packard
26	Others	

34% of respondents voted in this category

PHOTOS BY STAN MUSILEK

MASS STORAGE

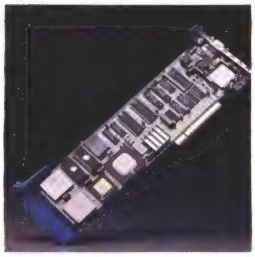
%	Product	Manufacturer
13	**Hardcard 40**	**Plus Development**
8	ST 225	Seagate
7	Bernoulli 20 + 20	Iomega
7	ST 251	Seagate
5	Bernoulli Box II	Iomega
5	ST 238	Seagate
55	Others	

32% of respondents voted in this category

MEMORY EXPANSION BOARD

%	Product	Manufacturer
20	**AboveBoard**	**Intel**
11	SixPakPlus	AST Research
10	Rampage AT	AST Research
9	Advantage Premium	AST Research
7	SixPak Premium	AST Research
43	Others	

29% of respondents voted in this category



LOCAL AREA NETWORK—NETWORK BOARD

%	Product	Manufacturer
24	**Token-Ring**	**IBM**
4	ArcNet	Novell
4	EtherLink	3Com
3	EtherLink Plus	3Com
3	IRMA	DCA
3	PC-110 Network	Standard Microsystems
59	Others	

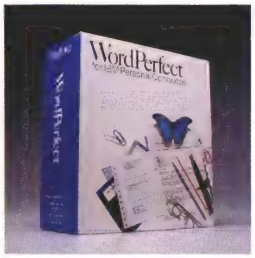
12% of respondents voted in this category

MOST PROMISING NEWCOMER—HARDWARE

%	Product	Manufacturer
9	**IBM PS/2 Model 80**	**IBM**
7	Compaq Deskpro 386/20	Compaq Computer
4	AST Premium/386	AST Research
4	Inboard 386	Intel
3	386 Motherboard	Hauppauge Computer Works
73	Others	

27% of respondents voted in this category

SOFTWARE



WORD PROCESSING

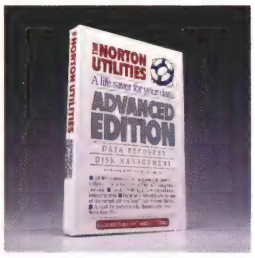
%	Product	Manufacturer
35	**WordPerfect**	**WordPerfect**
19	Microsoft Word	Microsoft Corp.
5	PFS: Professional Write	Software Publishing
4	WordStar 4.0	MicroPro
4	WordStar Professional	MicroPro
33	Others	

84% of respondents voted in this category

SPREADSHEET

%	Product	Manufacturer
40	**1-2-3**	**Lotus Development**
21	Microsoft Excel	Microsoft Corp.
12	Quattro	Borland Int'l
4	SuperCalc 4	Computer Associates
3	Symphony	Lotus Development
2	Lucid 3-D	PCSG
18	Others	

73% of respondents voted in this category



UTILITY

%	Product	Manufacturer
24	**Norton Utilities**	**Peter Norton Computing**
19	Norton Utilities Advanced	Peter Norton Computing
9	PC Tools Deluxe	Central Point Software
6	PC Tools	Central Point Software
3	Xtree Pro	Executive Systems
39	Others	

54% of respondents voted in this category

RELATIONAL DATA BASE

%	Product	Manufacturer
38	**dBASE III Plus**	**Ashton-Tate**
15	Paradox	Borland/Ansa
8	R:base System V	Microrim
4	R:base for DOS	Microrim
3	Foxbase +	Fox Software
32	Others	

52% of respondents voted in this category

COMMUNICATIONS

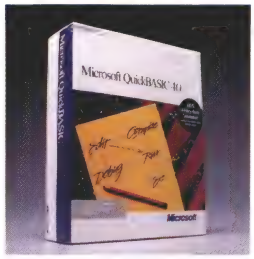
%	Product	Manufacturer
22	**ProComm**	**Datastorm Technologies**
11	Smartcom III	Hayes Microcomputer Products
9	Smartcom II	Hayes Microcomputer Products
8	Crosstalk XVI	DCA/Crosstalk Communications
7	ProComm Plus	Datastorm Technologies
43	Others	

41% of respondents voted in this category

PROGRAMMING LANGUAGE

%	Product	Manufacturer
23	**QuickBASIC**	**Microsoft Corp.**
22	Turbo Pascal	Borland Int'l
16	Microsoft C	Microsoft Corp.
11	Turbo C	Borland Int'l
5	Microsoft QuickC	Microsoft Corp.
23	Others	

39% of respondents voted in this category



OPERATING ENVIRONMENT

%	Product	Manufacturer
24	**Microsoft Windows**	**Microsoft Corp.**
17	Desqview	Quarterdeck Office Systems
12	Microsoft Windows/386	Microsoft Corp.
11	MS DOS/PC DOS 3.30	Microsoft/IBM
8	MS DOS/PC DOS 3.20	Microsoft/IBM
5	OS/2	IBM
23	Others	

38% of respondents voted in this category

DESKTOP PUBLISHING

%	Product	Manufacturer
41	**Ventura Publisher**	**Xerox**
33	PageMaker	Aldus
9	PFS: First Publisher	Software Publishing
2	Byline	Ashton-Tate
2	GEM Desktop Publisher	Digital Research
13	Others	

36% of respondents voted in this category

DESKTOP ORGANIZER

%	Product	Manufacturer
38	**SideKick**	**Borland Int'l**
16	Metro	Lotus Development
11	WordPerfect Library	WordPerfect
5	SideKick Plus	Borland Int'l
3	Memory Mate	Brøderbund
27	Others	

31% of respondents voted in this category

GAME

%	Product	Manufacturer
18	**Microsoft Flight Simulator**	**Microsoft Corp.**
7	Gunship	MicroProse
5	Chuck Yeager's Advanced Flight Simulator	Electronic Arts
3	Leisure Suit Larry	Sierra On-Line
3	Mean 18	Accolade
3	Star Flight	Electronic Arts
61	Others	

30% of respondents voted in this category

INTEGRATED

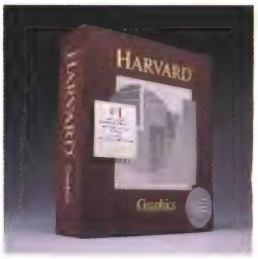
%	Product	Manufacturer
21	**Symphony**	**Lotus Development**
17	Framework II	Ashton-Tate
14	Microsoft Works	Microsoft Corp.
11	Enable	Software Group
10	Smart System	Innovative Software
27	Others	

27% of respondents voted in this category

BUSINESS GRAPHICS

%	Product	Manufacturer
34	**Harvard Graphics**	**Software Publishing**
11	Freelance Plus	Lotus Development
10	Harvard Presentation Graphics	Software Publishing
5	Microsoft Chart	Microsoft Corp.
3	Boeing Graph	Boeing
37	Others	

26% of respondents voted in this category



FLAT-FILE DATA BASE

%	Product	Manufacturer
20	**Q&A**	**Symantec**
15	PFS: Professional File	Software Publishing
13	Reflex	Borland Int'l
12	PC-File +	ButtonWare
2	RapidFile	Ashton-Tate
38	Others	

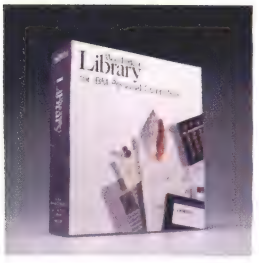
23% of respondents voted in this category

PHOTOS BY STAN MUSILEK

ACCOUNTING

%	Product	Manufacturer
27	**DacEasy**	**Dac Software**
15	Peachtree Complete II	Peachtree
4	Solomon III	TLB
3	Quicken/2	Intuit
2	Accounting Systems II	Peachtree
2	NewViews	Q.W. Page
47	Others	

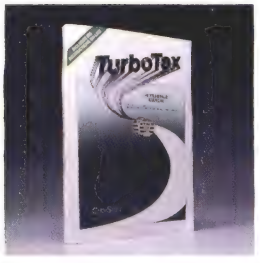
22% of respondents voted in this category



WORD PROCESSING UTILITY

%	Product	Manufacturer
16	**WordPerfect Library**	**WordPerfect**
8	Turbo Lightning	Borland Int'l
5	Pageview	Microsoft Corp.
5	Word Finder	Microlytics
4	RightWriter	RightSoft
62	Others	

21% of respondents voted in this category



TAX PLANNING OR PREPARATION

%	Product	Manufacturer
55	**Turbo Tax**	**ChipSoft**
13	Tax Preparer	HowardSoft
7	PC/Tax Cut	Best Programs
6	Andrew Tobias' Managing Your Money	MECA Ventures
3	J. K. Lasser's Your Income Tax	Simon & Schuster Software
16	Others	

21% of respondents voted in this category

PERSONAL FINANCE

%	Product	Manufacturer
55	**Andrew Tobias' Managing Your Money**	**MECA Ventures**
16	Dollars and Sense	Monogram
11	Quicken	Intuit
4	Money Counts	Parsons Technology
3	DacEasy Light	Dac Software
11	Others	

21% of respondents voted in this category

COMPUTER-AIDED DESIGN

%	Product	Manufacturer
46	**AutoCAD**	**Autodesk**
13	Generic CADD	Generic Software
7	DesignCAD	ASBC
5	Designer	Micrografx
3	DesignCAD-3D	ASBC
26	Others	

20% of respondents voted in this category

LOCAL AREA NETWORK—NETWORK OPERATING SYSTEM

%	Product	Manufacturer
25	**Netware**	**Novell**
17	Advanced Netware	Novell
6	3+	3Com
5	PC LAN Program	IBM
4	Vines	Banyan Systems
43	Others	

15% of respondents voted in this category

FINANCIAL ANALYSIS

%	Product	Manufacturer
21	**1-2-3**	**Lotus Development**
17	Andrew Tobias' Managing Your Money	MECA Ventures
12	Javelin Plus	Javelin Software
7	Microsoft Excel	Microsoft Corp.
5	Javelin	Javelin Software
38	Others	

11% of respondents voted in this category

DESKTOP PUBLISHING UTILITY

%	Product	Manufacturer
18	**Publisher's Paintbrush**	**Z-Soft**
5	GEM Draw Plus	Digital Research
5	Fontware	Bitstream
4	Designer	Micrografx
4	PageMaker Portfolio	Aldus
64	Others	

10% of respondents voted in this category

MOST PROMISING NEWCOMER—SOFTWARE

%	Product	Manufacturer
19	**Microsoft Excel**	**Microsoft Corp.**
9	Quattro	Borland Int'l
3	OS/2	IBM
2	Microsoft Windows	Microsoft Corp.
2	WordPerfect 5.0	WordPerfect
65	Others	

32% of respondents voted in this category

PHOTOS BY STAN MUSIEK

WHERE TO BUY

1-2-3
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500

AboveBoard
Intel Corp.
5200 N.E. Elam Young Pkwy.
Mailstop C03-07
Hillsboro, OR 97124-6497
503/629-7354

Andrew Tobias' Managing Your Money
MECA Ventures
355 Riverside Ave.
Westport, CT 06880
203/222-9150

AutoCAD
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
415/332-2344

Compaq Deskpro 386/20
Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
800/231-0900

Compaq Portable 386
Compaq Computer Corp.

DacEasy
Dac Software
17950 Preston Rd. #800
Dallas, TX 75252
800/992-7779

dBASE III Plus
Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502
213/329-8000

Epson LQ-2500
Epson America, Inc.
2780 Lomita Blvd.
Torrance, CA 90505
800/922-8911

Excel
Microsoft Corp.
16011 N.E. 36th Way, Box 97017
Redmond, WA 98073-9717
206/882-8080

Flight Simulator
Microsoft Corp.

Hardcard 40
Plus Development
1778 McCarthy Blvd.
Milpitas, CA 95035
408/434-6900

Harvard Graphics
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
408/848-4391

HP LaserJet Series II
Hewlett-Packard
Customer Information Center
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900

Microsoft Mouse
Microsoft Corp.

Microsoft Windows
Microsoft Corp.

NEC MultiSync II
NEC Home Electronics (USA), Inc.
1255 Michael Dr.
Wood Dale, IL 60191-1094
800/826-2255

Netware
Novell, Inc.
122 East 1700 S
Provo, UT 84601
800/453-1267

Norton Utilities
Peter Norton Computing
2210 Wilshire Blvd. #186
Santa Monica, CA 90401
213/319-2000

ProComm
Datastorm Technologies
1621 Towne Drive, Ste. G
Columbia, MO 65202
314/449-7012

PS/2 Model 80
IBM
Information Systems Group
900 King St.
Rye Brook, NY 10573
201/358-5689

Publisher's Paintbrush
Z-Soft Corp.
450 Franklin Roadway #100
Marietta, GA 30067
404/980-1950

Q&A
Symantec
Breakthrough Software Division
10201 Torre Ave.
Cupertino, CA 95014-2132
408/253-9600

QuickBASIC
Microsoft Corp.

SideKick
Borland Int'l
1800 Green Hills Rd.
Scotts Valley, CA 95066
408/438-8400

Smartmodem2400
Hayes Microcomputer Products
P.O. Box 105203
Atlanta, GA 30348
404/441-1617

Symphony
Lotus Development Corp.

Token-Ring
IBM

Toshiba T3100
Toshiba America, Inc.
Information Systems Div.
9740 Irvine Blvd.
Irvine, CA 92718
800/457-7777

Turbo Tax
ChipSoft
5045 Shoreham Pl. #100
San Diego, CA 92122
619/581-2233

Vega VGA
Video-7
46335 Landing Pkwy.
Fremont, CA 94538
800/238-0101, 800/962-5700 California

Ventura Publisher
Xerox Desktop Software
Xerox Corp.
1301 Ridgeview Dr.
Mailstop 179
Lewisville, TX 75067
800/822-8221

WordPerfect
WordPerfect Corp.
1555 N. Technology Way
Orem, UT 84057
801/225-5000

WordPerfect Library
WordPerfect Corp.

IS YOUR PC READY FOR OS/2?

WHEN WE SUBJECTED 33 PCs TO A BATTERY OF OS/2 PERFORMANCE BENCHMARKS—USING JUST-RELEASED OS/2 APPLICATIONS—THE RESULTS WERE DRAMATIC.

Eric Knorr

IBM and Microsoft assert that any PC with an 80286 or 80386 CPU can run OS/2. True enough—but how fast? To find out, National Software Testing Laboratories (NSTL) recently ran a suite of ground-breaking OS/2 benchmarks on thirteen 80286 and twenty 80386 machines. The conclusion: Most of today's 80286 machines are ill-equipped for OS/2 computing.

NSTL's OS/2 benchmarks numbered seven in all. The three single-task benchmarks are similar to the lab's standard DOS speed tests, only with brand-new OS/2 software: IBM's *DisplayWrite 4/2* and *C/2*, and Microrim's *R:base for OS/2*. The multitasking benchmarks used the three applications in various combinations. NSTL also ran its usual *1-2-3* tests in OS/2's DOS compatibility box.

Why did most of the 80286 machines do so poorly? OS/2, and especially multitasking under OS/2, requires large quantities of RAM—from 3MB to as much as 16MB. For acceptable performance, that RAM should be accessed at or near the full speed of the CPU. Of the thirteen 80286 machines tested, only IBM's PS/2 Models 50 and 60 and the AST Premium/286 accommodate over 1MB of zero-wait-state, CPU-speed RAM.

Raw clock speed and faster hard disks also help give the 80386 class a solid lead. The slowest 20-MHz 80386 machine, the IBM PS/2 Model 70-121, ran 38 percent faster than the top-performing Premium/286; the slowest 16-MHz 80386 PC, the ITT Xtra Professional Series 700, beat the Premium/286 by 16 percent. However, the newly released 12-MHz version of the Premium/286 may turn the tables.

Due to the Series 700's debilitating wait state, the 12-MHz, zero-wait-state Premium/286 should be able to access memory just as quickly as the Series 700, even though the two PCs' CPUs are different. (The 32-bit advantage of the 80386 is wasted on a 16-bit operating system like OS/2.) Thus, the poor OS/2 performance rating for most 80286 machines has more to do with the lower clock speeds and limited fast RAM endemic to the AT class than with any inherent deficiency in the 80286 chip.

NSTL's multitasking benchmarks demonstrate the importance of large fast-RAM capacity. The results also support one of OS/2's key selling points: its efficient method of assigning priorities among multiple tasks. As Microsoft claims, the task you work with on screen takes precedence, leaving background tasks such as printing, sorting, and searching for leftover CPU time. Background tasks may take a long time to complete, but NSTL's technicians confirm that the apparent speed of the on-screen application (particularly its keystroke response) degrades only slightly when you load applications behind it.

Consider the plight of the 12-MHz Compaq Deskpro 286, which accommodates a maximum 2.1MB of one-wait-state RAM on the motherboard. The unit's speedy cousin, the Deskpro 386/20, outfitted with a 32K, zero-wait-state memory cache backed up by 5MB of system memory, completed multitasking Test 3 (which employs two concurrent *DisplayWrite 4/2* sessions) in 1 minute, 59 seconds; the Deskpro 286 did it in 5 minutes, 46 seconds. In Test 2, which adds a disk-intensive *R:base for OS/2* session and an IBM C/2 routine to the two *DisplayWrite 4/2* tasks, the Deskpro 386/20 did the job in 9 minutes, 52 seconds, while the Deskpro 286 finished in 27 minutes, 2 seconds. With both machines, adding the two additional tasks increased total execution time by a factor of about 5; the threefold advantage enjoyed by the Deskpro 386/20 stayed more or less constant.

If a system has a low motherboard memory capacity (and/or a dedicated memory slot), installing a memory board on the expansion bus would seem an obvious way to beef up performance. Unfortunately, most systems access memory on the expansion bus at a much slower speed than they access motherboard memory. To make matters worse, OS/2 (unlike DOS) loads applications in higher memory first.

That means that if you've installed a memory expansion board, both OS/2 and its applications fill up the board's RAM before they fill the faster motherboard memory. Consequently, when NSTL tested Dell's System 200, the machine was slower with 3.6MB of RAM—2MB of which resided on an Intel Above-Board—than it was with 1.6MB of motherboard RAM alone.

The winning 80386 PC, not surprisingly, was the 25-MHz Deskpro 386/25. Generally, performance among the 80386 machines was remarkably varied. One thing is clear: Memory caching helps.

The winning 20-MHz 80386 machine was the cache-based Everex STEP 386/20, followed closely by the ALR FlexCache 20386, the Dell System 310, and the Deskpro 386/20. While all four units run at 20 MHz and use memory caching, the STEP 386/20 has a large 256K cache and a proprietary caching architecture; the three others use Intel's 82385 cache controller to manage a 32K cache, a design pioneered by the Deskpro 386/20.

The IBM PS/2 Model 70-121, slowest of the 20-MHz contenders, does not use memory caching. Neither do the Model 80-111 or the AST Premium/386, which are only slightly faster than the Model 70-121. In addition, the low scores of the 20-MHz Models 70 and 80 suggest that whatever benefits the Micro Channel may have for OS/2-based multitasking are eclipsed by the advantages of memory caching. Perhaps this is why the new 25-MHz Model 70-A21—like the new Deskpro 386/25—sports an 82385 cache controller and 64K of cache RAM.

All the 20-MHz PCs tested employ a high-performance ESDI hard disk with a 1:1 interleave plus disk-caching software. An ESDI drive gets the most out of a 20-MHz or 25-MHz system; otherwise, the CPU ends up waiting for hard disk

System Configurations

	Processor speed (MHz)	Amount of RAM as tested (MB)[1]	Maximum fast RAM installable (MB)[2]	Type of coprocessor	Speed of coprocessor (MHz)	Size of hard disk (MB)	Hard disk access time (ms)	Hard disk interleave
80286 systems								
Acer 910	10[3]	4	1	80287	8	44.5	28	2:1
ALR Dart-40	10[4]	4	2	80287	10	44.5	28	2:1
AST Premium/286	10	3	4[5]	80287	8	44.5	28	2:1
Compaq Deskpro 286	12	4.1	2.1	80287	8	42.6	29	2:1
Dell System 200	12.5	4.1	4.6	80287	8/12[6]	42.5	28	2:1
Epson Equity III+	12	3.1	640K[7]	80287	8	44.5	28	2:1
IBM PS/2 Model 50	10	3	16[8]	80287	10	20	80	1:1
IBM PS/2 Model 50 Z	10	3	16[8]	80286	10	30	39	1:1
IBM PS/2 Model 60	10	3	16[8]	80287	10	44.5	40	1:1
Mitsubishi MP 286-340E	12	4.6	4.6	80287	8	42.6	28	2:1
NCR PC810	10	3.1	640K	80287	8	21.3	40	2:1
Tandy 3000	12	4.6	640K	80287	8/10[9]	44.5	28	2:1
Wyse PC 286	12.5	3.5	1	80287	10	42.6	28	2:1
16-MHz 80386 systems								
Acer 1100	16	5	9	80387	16	72	24	3:1
Compaq Deskpro 386	16	4	13	80387	16	43	27	2:1
Compaq Deskpro 386S	16	4	13	80387SX	16	40	29	1:1
Dell System 300	16	4	6	80287	8	42	27	2:1
IBM PS/2 Model 70-E61	16	3	6	80387	16	60	29	1:1
IBM PS/2 Model 80-71	16	3	6	80387	16	70	30	1:1
ITT Xtra Professional Series 700	16	4	16	80287	10	43	27	2:1
Mitsubishi MP 386	16	5	10	80387	16	43	27	2:1
NCR PC916	16	4	8	80387	16	32	35	3:1
Tandy 4000	16	4	4	80287	8	44	31	3:1
Wyse PC 386	16	4	18	80387	16	43	27	1:1
Zenith Z-386	16	3	16	80387	16	72	26	2:1
20-MHz 80386 systems								
ALR FlexCache 20386	20	4	10	80387	20	151	19	1:1
AST Premium/386	20	4	13	80387	20	89	19	1:1
Compaq Deskpro 386/20	20	5	16	80387	20	135	17	1:1
Dell System 310	20	4	16	80387	20	89	19	1:1
Everex STEP 386/20	20	4	16	80387	20	80	31	1:1
IBM PS/2 Model 70-121	20	3	6	80387	20	120	23	1:1
IBM PS/2 Model 80-111	20	4	4	80387	20	115	28	1:1
25-MHz 80386 systems								
Compaq Deskpro 386/25	25	3	16	80387	25	300	20	1:1

[1] Although the systems tested had different amounts of RAM, none of the OS/2 tests required more than 3MB.

[2] Fast RAM is defined as RAM accessed at or near the speed of the CPU (that is, through the memory bus, not the expansion bus).

[3] The Acer's processor speed must be dropped to 6 MHz to make the expansion bus compatible with the standard bus.

[4] The ALR's processor speed must be dropped to 8 MHz to make the expansion bus compatible with the standard bus.

[5] The AST Fastslots are capable of 10 MHz with zero wait states.

[6] The Dell System 200 has an adjustable CMOS coprocessor setting that allows the coprocessor to perform at either fast or slow speed.

[7] The Epson has expansion bus states adjustable from one to four wait states.

[8] The IBM PS/2 Model 50 and 60 Micro Channel expansion bus is capable of zero-wait-state operation.

[9] The Tandy has an oscillator that must be installed to allow the coprocessor to operate at 10 MHz.

I/O, slowing down disk-intensive operations (a SCSI drive does even better). And because multiple sessions increase the number of random seeks, a hard disk's average access time is critical. All but one of the four winning systems have fast hard disks with average access times under 20 milliseconds.

Although NSTL's benchmarks represent the most comprehensive application-based OS/2 speed tests to date, keep in mind that the applications used for these benchmarks are first-generation OS/2 programs not fully optimized for OS/2. Also, the tests were performed without the Presentation Manager. Even with future OS/2 programs that take full advantage of multithreading, the processing overhead incurred by the Presentation Manager is sure to slow things down even further—an especially gloomy sce-

NSTL TEST REPORT

80286 systems	Multitasking test 1	Multitasking test 2	Multitasking test 3
Acer 910	583	1450	293
ALR Dart-40	596	1465	294
AST Premium/286	480	1181	228
Compaq Deskpro 286	675	1622	346
Dell System 200			
with AboveBoard	633	1938	353
without AboveBoard [2]	n/a	n/a	n/a
Epson Equity III+	814	2048	350
IBM PS/2 Model 50	614	1601	307
IBM PS/2 Model 50 Z	470	1358	257
IBM PS/2 Model 60	580	1460	291
Mitsubishi MP 286-340E	690	1721	353
NCR PC810	704	1748	349
Tandy 3000	829	2090	434
Wyse PC 286	800	1987	357
	seconds (0–1000)	seconds (0–3000)	seconds (0–500)
16-MHz 80386 systems			
Acer 1100	337	808	160
Compaq Deskpro 386	350	851	169
Compaq Deskpro 386S	382	935	191
Dell System 300	335	798	151
IBM PS/2 Model 70-E61	353	873	176
IBM PS/2 Model 80-71	334	840	172
ITT Xtra Professional Series 700	407	980	192
Mitsubishi MP 386	389	936	180
NCR PC916	356	847	159
Tandy 4000	391	919	183
Wyse PC 386	341	814	157
Zenith Z-386	339	810	153
	seconds (0–500)	seconds (0–1000)	seconds (0–200)
20-MHz 80386 systems			
ALR FlexCache 20386	240	563	118
AST Premium/386	273	653	136
Compaq Deskpro 386/20	246	592	119
Dell System 310	243	573	109
Everex STEP 386/20	235	560	110
IBM PS/2 Model 70-121	303	724	114
IBM PS/2 Model 80-111	276	673	140
25-MHz 80386 systems			
Compaq Deskpro 386/25	221	503	102
	seconds (0–400)	seconds (0–800)	seconds (0–200)

[1] The Acer 910 was limited to 512K of "conventional" memory when extended memory was used, which prevented the 1-2-3 benchmark from being run in the compatibility box.

[2] Dell could populate the motherboard with only 2MB, which was sufficient to run just two of the OS/2 benchmarks. The AboveBoard added 2MB to the expansion bus.

Multitasking test 1
The *DisplayWrite 4/2* benchmark is run in the foreground. The *R:base for OS/2* benchmark is run in the background along with a session of *DisplayWrite 4/2* printing a 35-page document to the spooler and, eventually, to an IBM Proprinter II. Time is measured from when the foreground *DisplayWrite 4/2* benchmark begins until the *R:base for OS/2* benchmark ends. The time it takes for printing to finish is not included.

Multitasking test 2
The *DisplayWrite 4/2* benchmark is run in the foreground. The *R:base for OS/2* and IBM C/2 benchmarks are run in the background along with a session of *DisplayWrite 4/2* printing a 35-page document to the spooler and, eventually, to an IBM Proprinter II. Time is measured from when the foreground *DisplayWrite 4/2* benchmark begins until the IBM C/2 benchmark ends. The time it takes for printing to finish is not included.

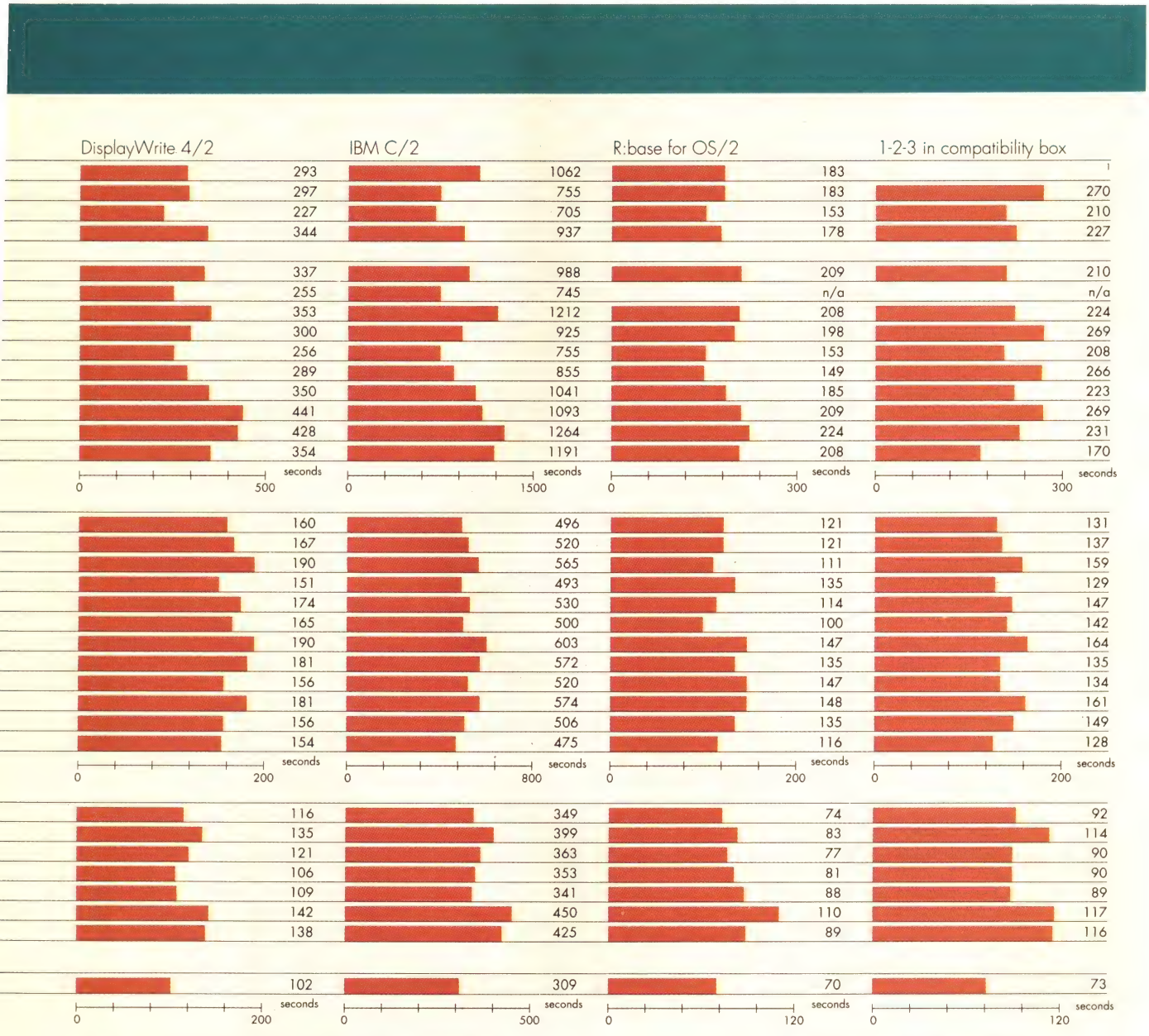
Multitasking test 3
The *DisplayWrite 4/2* benchmark is run in the foreground while a background session of *DisplayWrite 4/2* prints a 35-page document to the OS/2 spooler and, eventually, to an IBM Proprinter II. Time is measured from when the *DisplayWrite 4/2* benchmark begins until that benchmark ends. The time it takes for printing to finish is not included.

IBM DisplayWrite 4/2
Although the hard disk access rate plays a small part in

nario for most of today's 80286 PCs.

It's a mistake to jump to conclusions based purely on current performance benchmarks, because no one yet knows how users will exploit multitasking. With multitasking, it's work throughput that counts; executing tasks simultaneously is always faster than performing them one after another. Nonetheless, watching a system with a meager memory capacity slow to a crawl is no picnic. Early returns indicate that the ideal platform for OS/2 is a 20-MHz (or faster) 80386 machine with memory caching, enough room for 16MB of zero-wait-state memory, and a swift ESDI or SCSI hard disk. In short, the fastest PC you can afford. ●

Eric Knorr is a senior editor for PC World.



this benchmark, processing and memory access speeds are the most significant factors. Memory architecture affects memory access speed: Systems that require additional memory in standard expansion slots to run OS/2 exhibit below-average performance.

While *DisplayWrite 4/2* is loading, the keystrokes to start a *DisplayWrite* macro are entered. The macro loads a 35-page, 140-paragraph document, replaces each occurrence of the word *today* with *tomorrow*, uses the built-in spelling checker to look for any incorrectly spelled words (there are none), paginates the document, prints the first page to an IBM Proprinter II, and exits *DisplayWrite*.

IBM C/2
In this benchmark, processing and hard disk sequential-access speeds are the most important factors. The benchmark measures the time required to compile the 25 C source code files that make up XLISP, a public-domain LISP interpreter.

R:base for OS/2
Processing and hard disk random-access speeds are the most significant factors for this benchmark. Disk caching, if present, will dramatically improve apparent disk access speed. This benchmark measures the time it takes to produce a report based on a three-file join, select, and sort.

1-2-3 in OS/2's compatibility box
The *1-2-3* benchmark used for DOS is run in OS/2's DOS compatibility box. It uses a macro to perform a series of recalculations and depends almost entirely on a system's processing and memory access speeds. The test gives an indication of the performance of the system running a program in the compatibility box. It is performed with the coprocessor installed.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

D • O • S LIVES!

THE RUMORS OF DOS'S DEMISE HAVE BEEN GREATLY EXAGGERATED. AS THE RELEASE OF DOS 4.00 SHOWS, THERE'S LIFE IN THE OLD WORKHORSE YET.

SCOTT SPANBAUER AND ROBERT LUHN

OS/2 may indeed propel personal computing to a higher plane—someday. But until meaty, multithreaded OS/2 applications arrive—and until 80386-based systems with 4MB of RAM are priced around $2000—DOS will have to do.

Fortunately, IBM hasn't rested on its money bags. This latest release of the venerable operating system is infused with new features, including a graphic user interface similar to OS/2's Presentation Manager and some extras that even OS/2 lacks.

Among DOS 4.00's many enhancements are EMS 4.0 expanded memory support, the ability to create hard disk partitions of up to 2 gigabytes (versus DOS 3.30's and OS/2's 32MB limit), an automated installation program, and in-context help. But the most welcome enhancement (especially for newcomers) is a mouse- or keyboard-driven graphic (or text-mode) shell that lets you pluck DOS commands from pulldown menus, run programs with the click of a mouse, manage files and subdirectories in *Xtree*-like fashion, and create custom help screens and dialog boxes in a flash. You'll never struggle with a DOS prompt again, and you'll be prepared for the future, too, since the shell's Start Programs and File System screens closely mimic their counterparts in the OS/2 Presentation Manager (see the preview "Windows on OS/2," *PCW*, September 1988).

Just keep in mind that the DOS 4.00 shell isn't strictly an environment—it can't run programs in multiple on-screen windows. But at least you're not restricted to programs written specifically for the interface; all existing DOS programs and batch files (with the exception of *Windows 2.03* and a few early copies of *Windows/386 2.10*) run from the shell without a hitch.

The DOS Shell Game

DOS shells like *Xtree* are naturally popular with new users: These shells display a comprehensible directory tree and allow you to perform copy, move, delete, and other operations on files en masse. But if you want to run a program, you must typically exit to the DOS prompt, log on to the proper subdirectory, type the name of the command file (or batch file), and press <Enter>. DOS 4.00 fills this gap, seamlessly merging the simplicity of a shell with the power of batch files.

Start Programs, the shell's opening screen, initially lists a handful of DOS utilities and the File System program. Double-clicking a listed item or highlighting it and pressing <Enter> clears the shell from the screen and runs the program; exit the program, and Start Programs reappears automatically. To add a program to the list, you pick a menu command and supply the name of the program in the subsequent on-screen form, as well as the commands you'd normally put in a batch file to locate and execute the program (such as CD\WORD and WORD/C).

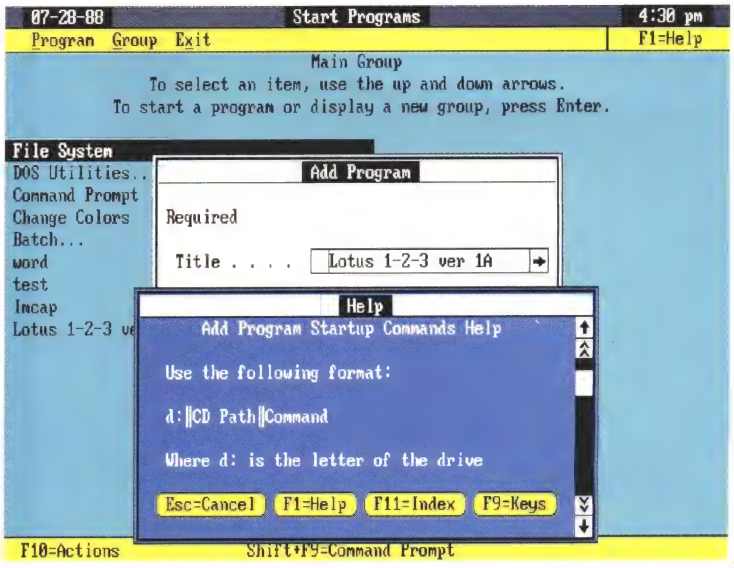
A Tree, and More

At first glance the File System screen resembles *Xtree*, complete with a scrollable directory tree in one window and file listings in another. Pulldown menu options reveal impressive capabilities: You can view two directories at a time or, better still, view all the files on a drive sorted by name, extension, size, or date, regardless of subdirectory. You can not only perform move, copy, rename, and delete operations on individual files or groups of files, you can also change a file's hidden, read-only, and archive attributes. A DOS 4.00 feature that will give *Xtree*'s authors nightmares, however, is the ability to link a data file with its application. Double-click a *1-2-3* worksheet, for example, and *1-2-3* is loaded and the worksheet opened.

DOS Better

Even those who prefer the DOS prompt to DOS 4.00's user-friendliness should consider upgrading—a fast and easy task, thanks to the automated install program. You'll find numerous small enhancements to existing commands and utilities (see the sidebar below) and a couple of major improvements. Disk partitions can exceed 32MB, making life easier for data base, graphics, and CAD users who frequently manipulate multimegabyte files. Microsoft claims that DOS 4.00's larger File Allocation Tables will also speed file access.

The expanded memory barrier has been broken, too, now that DOS supports EMS 4.0 expanded memory boards and IBM's XMA boards. Software developers are the first beneficiaries of this change, since they can now rely on the DOS EMS drivers instead of having to provide their own. Eventually, it may mean less complicated installation of *Framework*, *1-2-3*, *Desqview*, and other programs that automatically use expanded memory. For the time being, the drivers allow you to create RAM disks in expanded memory with DOS's VDISK.SYS, speed disk operations by allocating up to 10,000 buffers in expanded memory, and treat extended memory on 80386-based machines as expanded memory. However, you can't run the shell or DOS itself in expanded memory.



It's easy to add your favorite programs—with customized help screens—to DOS 4.00's Start Programs display.

As with past versions of DOS, you can buy DOS 4.00 from IBM dealers (for $150, $95 if you're upgrading) or obtain it from your system vendor. Either way, you're getting a deal. The makers of *Xtree*, *Q-DOS II*, *The Norton Commander*, and other DOS shells that benefited from DOS's past failings, however, had better scamper back to the drawing boards. DOS does more, does it better, and in most cases, does it for less.

Scott Spanbauer is an assistant editor and Robert Luhn a senior editor for PC World.

DOS 4.00 COMMANDS: NEW AND IMPROVED

NEW

MEM Displays conventional and extended memory allocation.

SWITCHES Allows older programs to work with the enhanced keyboard.

ENHANCED

ANSI.SYS Reassigns extended-key values, prevents applications from changing the number of screen display lines specified by MODE, and prevents use of extended keyboard functions.

BACKUP Automatically formats unformatted target disks.

BUFFERS Permits 10,000 buffers in expanded memory.

CHKDSK Notes size and number of available clusters.

DEL/ERASE Asks for confirmation before deleting file.

FDISK Accepts partition size in megabytes or in percentage of total disk space.

FORMAT /V:*label* skips prompt to enter volume label after formatting; /F:*size* allows you to format low-capacity disks in high-capacity drives.

GRAPHICS Supports EGA and VGA print screens as well as output in 19 shades of gray or 8 colors.

MODE Specifies keystroke repeat rates, number of lines on screen, and asynchronous parameters.

REPLACE Replaces target disk files with more recent source disk files.

SYS Recognizes source drive and path names.

TIME Accepts 12-hour format entries.

TREE Generates treelike directory display.

VDISK Works with expanded memory.

ON-LINE SERVICES AND DATA BASES

Scott Spanbauer

The information you need is probably only a handshake away. Welcome to PC World's sampler of on-line services, data base vendors, and data bases.

The amount and variety of information available through your modem is staggering; just about anything you ever wanted to know is at your fingertips, and experts in a wide variety of fields stand ready to answer your questions. But extracting valuable data from the mountain of on-line business intelligence, statistics, publications, and reports can be time-consuming and costly.

The trick is to find the on-line source that offers the information you need at the lowest price, and to avoid paying for services you won't use. By acquainting you with the quantity, quality, and cost of information available on line, this Buyers' Guide can help you become a smarter on-line shopper.

The guide is divided into separate listings: on-line services, data base vendors, and data bases themselves. On-line services, like CompuServe and The Source, are multi-featured electronic supermarkets that offer not only stored data on many hundreds of topics but also direct access to knowledgeable people through electronic mail, special interest groups (SIGs), topical conferences, and bulletin boards. Access to some data bases is usually included in the price of the subscription, and hundreds of public-domain and shareware programs are ready for downloading. On-line services tend to be relatively inexpensive, but most lack the specialized resources needed by hard-core researchers.

Professional researchers will probably gravitate toward dedicated data base vendors like Dialog Information Services, Dow Jones News/Retrieval, and BRS Information Technologies. These data base department stores often contain hundreds of full-text data bases, allowing the user to download complete articles from newspapers, magazines, newsletters, and professional journals. Other data bases provide only bibliographic citations and/or summaries.

Some on-line services and data base vendors offer amiable, menu-driven interfaces that can mean the difference between success and failure to a novice searcher. These services tend to charge higher rates. Others have command-driven interfaces that take a while to learn but reduce the time spent on line by experienced searchers. Obviously, on-line help, toll-free phone support, user manuals, and even training classes are desirable, especially with hard-to-use data bases.

Costs range widely and include one-time sign-up fees, monthly or annual fees, and connect-time charges that vary according to the time of day, the day of the week, and the bps rate. Data bases sometimes charge by the search, with a surcharge for hard copy. Some services offer local telephone-access numbers; others require the use of access services like Tymnet or Telenet, at an additional on-line charge.

Many on-line services also offer gateways to one or more other services, usually at a slight premium over the usual cost of the service accessed. For occasional use, this can be more economical than subscribing to multiple services.

Because on-line services and data bases are so numerous, this directory is limited to the biggest U.S. general-interest services plus a selection of useful data bases for a range of topics. For more information about the more than 3500 data bases not included in this guide, get a copy of the *Directory of Online Databases* (sometimes called the Cuadra directory), published quarterly by Cuadra/Elsevier, New York. (You may want to look for it at the library, since an annual subscription exceeds $200.) Other excellent resources include *The Complete Handbook of Personal Computer Communications* and *How to Look It Up Online*, both by Alfred Glossbrenner and published by St. Martin's Press, New York.

ON-LINE SERVICES

CompuServe

This 18-year-old information service offers electronic mail and holds more than 400 data bases covering education, entertainment, finance, games, home, health and family, news, personal computing, shopping, travel, and weather. More than 140 SIGs offer on-line conferencing, bulletin boards, and thousands of shareware and public-domain programs for downloading. SIG topics include automobile racing, computer graphics, entrepreneurship, games, health, law, marketing, medicine, music, public relations, religion, and even tropical fish.

CompuServe offers gateways to EAASY Sabre (American Airlines' flight schedule and reservation service), Travel Shopper, OAG (Official Airline Guide), Iquest, and MCI Mail. The service has on-line help and a user manual but doesn't offer training seminars. Access is via local phone numbers in more than 300 U.S. cities or through Telenet, Tymnet, or DataPac at 300, 1200, 2400, 4800, or 9600 bps.

The $39.95 one-time sign-up fee includes a $25 usage credit. On-line charges are $6 per hour at 300 bps and $12.50 per hour at 1200 and 2400 bps, 24 hours a day. Charges for 4800-bps access are $32.50 and $29 per hour for prime- and non-prime-time use, respectively. At 9600 bps the charges are $47.50 and $44 per hour for prime and non-prime time. Access to approximately 10 percent of CompuServe's data bases requires an additional fee. CompuServe's prime time is 8 a.m. to 6 p.m., Monday through Friday.

CompuServe
5000 Arlington Center Blvd.
Columbus, OH 43220
800/848-8199

Delphi

Delphi, aimed at both individual and corporate users, offers electronic mail, stock and commodity quotes, and over 150 data bases covering business and finance, entertainment, magazines and books, merchandise, news, weather, sports, and travel. Delphi has over 30 SIGs that offer downloadable software, bulletin boards, and on-line conferencing. SIG topics include antiques and collectibles, aviation, computer art, games, hobbies, IBM PC and compatible computers, music, theology, and writing.

Delphi offers gateways to OAG, EAASY Sabre, Dialog, CAIN (Computerized AIDS Information Network), and HealthNet. The service has on-line help and a user manual but doesn't offer training seminars. Access is via Telenet or Tymnet at 300, 1200, or 2400 bps.

Delphi charges a one-time subscription fee of $49.95. On-line charges are $17.40 per hour during prime time (7 a.m. to 6 p.m. Monday through Friday) and $7.20 an hour during non-prime time. There is a $24-per-month minimum billing "advantage plan" for frequent users, who pay $16.20 and $5.40 per hour for prime- and non-prime-time use, respectively.

General Videotex
3 Blackstone St.
Cambridge, MA 02139
800/544-4005, 617/491-3393

Dialcom Services

Dialcom's electronic mail network spans 17 countries and is geared toward corporate users; it does not host any public SIGs, bulletin boards, or conferences. Among its 15 data bases are the Associated Press, Business Wire, Government News, United Press International, stock reports, and an optional clipping service. Dialcom offers gateways to Dow Jones News/Retrieval, EAASY Sabre, Fedwire, and OAG.

Dialcom has both on-line and phone help, a user manual, and an on-line tutorial. Training seminars are held frequently in Boston, Chicago, Dallas, Houston, New York City, San Diego, San Francisco, Washington, D.C., and Rockville, Maryland, at a cost of $50 per hour. Access is via Telenet, Tymnet, ConnNet, or WATS at 300, 1200, or 2400 bps.

There is a $25 registration fee and a $25 minimum monthly billing for individuals; corporations pay no registration fee and receive discounted rates but must pay minimum monthly billings of $500 or more, plus an additional $100 per month account fee. On-line charges for individuals are $14 and $6.50 per hour for prime- and non-prime-time use, respectively. Corporate accounts are charged $11.90 and $5.55 per hour for prime- and non-prime-time use. Dialcom's prime-time hours are 8 a.m. to 6 p.m., Monday through Friday.

Dialcom
6120 Executive Blvd.
Rockville, MD 20852
800/435-7342, 301/881-9020

EasyLink Service

Essentially an electronic mail service with extensive paper delivery options, EasyLink also incorporates InfoMaster, a costly but easy-to-use menu-driven

search interface, for use with over 900 data bases, including all those supplied by BRS, Dialog, Orbit, NewsNet, Vu/Text, and Wilsonline.

EasyLink has on-line help and a user manual, and corporations can request training seminars. The service offers a gateway to FYI, which includes EasyNet, OAG, and Dow Jones News/Retrieval. Access is via local access numbers, Tymnet, and WATS at 300, 1200, 2400, or 9600 bps.

InfoMaster costs 15 cents per minute plus $8 for each successful search. Electronic mail charges are by the character; a one-page business letter costs about 40 cents. Minimum monthly billing is $25.

Western Union Telegraph Co.
One Lake St.
Upper Saddle River, NJ 07458
800/527-5184

GEnie

Home user–oriented GEnie offers electronic mail and 80 data bases encompassing finance, games, on-line magazines, news, shopping, and travel. Over 40 SIGs offer bulletin boards, on-line conferencing, and public-domain software libraries. Topics include desktop publishing, genealogy, law, music, photography, science fiction, and writing, as well as some manufacturer-supported user groups providing on-line product support.

GEnie has on-line and phone help and both on-line and printed user manuals, but doesn't give training seminars. The service features gateways to EAASY Sabre, Dow Jones News/Retrieval, American Express Advance, Vestor, and Comp-U-Store. Access is via local access numbers in 550 U.S. cities at 300, 1200, or 2400 bps.

A one-time $29 subscription fee includes 2 hours of free non-prime-time use. Charges at 300 or 1200 bps are $35 and $5 per hour for prime and non-prime time, respectively. At 2400 bps, access costs $45 and $12 per hour for prime- and non-prime-time use, respectively. Prime time is 8 a.m. to 6 p.m., Monday through Friday.

General Electric Information Services Co.
401 N. Washington St.
Rockville, MD 20850
800/638-9636

The Source

Targeted at business and financial researchers, The Source's more than 200 data bases cover business, communications, education, investing, news, sports, travel, and weather. General interest SIG topics include cooking, games, music, and science fiction; professional SIGs cover education, investing, law, and medicine. There are also user groups for Ashton-Tate, IBM, and Microsoft products, among others, and more than 2000 public-domain programs available for downloading. The Source's electronic mail service offers paper delivery options as well.

The Source has gateways to Grolier's Encyclopedia, Investext (brokerage research reports), OAG, Profiteer (stock analysis), Real-Time Stock Quotes, and Stockvue (a financial analysis data base). Subscribers get on-line or voice help, a user manual, and an on-line tutorial, but no instructional seminars. Access is via Telenet at 300, 1200, or 2400 bps.

The Source charges a one-time $29.95 fee to join and a monthly minimum billing of $10. On-line charges vary, depending on the data base used. During prime time (7 a.m. to 6 p.m., Monday through Friday), charges are 36 cents to 75 cents per minute at 300 bps, 43 cents to $1.50 per minute at 1200 bps, and 46 cents to $1.50 per minute at 2400 bps. Non-prime-time costs are 14 cents to 70 cents per minute at 300 bps, 18 cents to $1.35 per minute at 1200 bps, and 20 cents to $1.35 per minute at 2400 bps.

The Source's SIGs are available at substantially discounted rates.

Source Telecomputing
1616 Anderson Rd.
McLean, VA 22102
800/336-3366

DATA BASE VENDORS

BRS Search, BRS Colleague, BRS After Dark

BRS Search is a command-driven data base service available from 6 a.m. to 4 a.m.; BRS Colleague, a menu-driven version of Search, is available during the same hours at a substantially higher rate. BRS After Dark, a less expensive, menu-driven service aimed at the home market, contains a subset of the Search and Colleague data bases and is available from 6 p.m. to 6 a.m. Search and Colleague share 150 data bases that contain the full text of and bibliographic references to hundreds of books and journals covering business and finance, education, energy and environment, medicine, science, social science, and the humanities. After Dark offers about 80 of these data bases.

All three services offer electronic mail, and Colleague offers the only SIG for physicians. Search has on-line help, a practice library, and a user manual, and training seminars are held weekly throughout the United States at a cost of $55 for a half day and $95 for a full day. Access is via Telenet, Tymnet, or WATS at 300, 1200, or 2400 bps.

Search charges a $75 annual fee with no monthly minimum, a $25 per hour connect fee, plus telecommunications, data base royalty, and citation charges. Colleague charges a one-time $95 subscription fee and requires a $20 minimum monthly billing. On-line charges range from $6 to $156 per hour, depending on the data base being searched, with most charges falling between $20 and $79 per hour. After Dark has a one-time $75 subscription fee and a $12 minimum monthly billing. On-line charges vary from $5 to $35, averaging between $10 and $15.

BRS Information Technologies
1200 Route 7
Latham, NY 12110
800/468-0908

Dialog

Dialog's more than 300 data bases cover public and private companies, agriculture, bioscience, chemicals, computer science, current affairs, education, energy, the environment, industry, law and government, medicine, patents, and science and technology. Three companion data base services, Dialog Business Connection, Dialog Medical Connection, and Knowledge Index, offer subsets of Dialog's data bases that are geared toward business, medical, and home users, respectively.

Dialog has electronic mail and gateways to OAG and Trade-Plus (a stock quote service) and offers a user manual but no on-line help. A one-day basic training seminar is available for $125; ten advanced seminars on specific subject areas cost $125 each for a full day or $55 for a half day. Access is via Telenet, Tymnet, or Dialnet, Dialog's own local access network, at 300, 1200, or 2400 bps.

A $150 starter package includes a user manual, a full day of training, and $100 of connect time. Thereafter there is a $25 annual fee. On-line charges vary with the data base accessed, averaging $90 per hour; Knowledge Index is considerably cheaper, averaging $24 per hour.

Dialog Information Services
3460 Hillview Ave.
Palo Alto, CA 94304
800/334-2564, 415/858-3785

Dow Jones News/Retrieval

Dow Jones News/Retrieval's 42 data bases offer full text of the *Wall Street Journal* and the *Washington Post* from January 1984 to the present, full text of articles from more than 140 regional business journals, as well as government and private business and industry information. Dow Jones News/Retrieval's news wire provides stock market quotes and up-to-the-minute reports on companies, markets, industries, and investments.

Dow Jones News/Retrieval has gateways to MCI Mail and DataTimes. On-line and telephone support and a user manual are available, and training seminars are given each week throughout the United States at $80 per day. Access is via Telenet, Tymnet, or gateways from other services at 300, 1200, or 2400 bps.

Personal accounts incur a $29.95 one-time start-up fee and a $12 annual service fee beginning with the second year. For corporate accounts, the start-up fee is $49.95. On-line charges depend on the data base used. At 300 bps, charges range from 60 cents to $1.20 per minute during prime time and from 10 cents to 80 cents per minute during non-prime time. At 1200 and 2400 bps, prime-time charges range from $1.32 to $2.64 per minute, and non-prime-time rates range from 10 cents to $1.76 per minute. Prime time is 6 a.m. to 6 p.m., Monday through Friday.

Dow Jones and Co.
P.O. Box 300
Princeton, NJ 08543
800/522-3567

EasyNet

EasyNet provides a menu-driven interface to over 900 data bases from 13 different vendors including BRS, Dialog, and Vu/Text. Subject areas include the arts and humanities, business and industry, computers, economics and finance, entertainment, engineering, government, international news, investment, magazines and newspapers, medicine, and science. EasyNet translates the user's search query into the particular vendor's language and can search multiple data bases.

EasyNet offers only on-line help, although a user manual and training seminars reportedly are in development. There are no SIGs or gateways. EasyNet charges $10 per successful search, plus per-document data base royalties that vary according to the data base searched. Access is via Telenet and Tymnet at 300 or 1200 bps.

Telebase Systems
763 W. Lancaster Ave.
Bryn Mawr, PA 19010
800/327-9638

NewsNet

NewsNet data bases include full-text articles drawn from over 320 business and government newsletters and news wires covering aerospace, computers, defense, electronics, domestic and international finance, international business news, and telecommunications.

Although it lacks SIGs, NewsNet does offer gateways to Vu/Quote, OAG, Computer Multiple Listing Service, and TRW. On-line and voice help and a user manual are available. Training seminars are held in New York, Philadelphia, and Washington, D.C., for $60 per 3-hour session.

NewsNet charges an annual fee of $120, plus $60 per hour at 300 and 1200 bps or $90 per hour at 2400 bps. There may be additional data base royalties. Access is via Telenet and Tymnet at 300, 1200, or 2400 bps.

NewsNet Inc.
945 Haverford Rd.
Bryn Mawr, PA 19010
800/345-1301, 215/527-8030

Lexis

Lexis is a legal research service containing approximately 300 data bases that cover federal and state court decisions; state statutes, codes, regulations, and administrative agency rulings; and legal analyses of banking, bankruptcy, corporate, health, insurance, international trade, labor, public contract, public utility, securities, and tax laws.

Lexis offers no SIGs and only one gateway to its sister service, Nexis. Lexis has on-line help and a user manual. Free 2-hour classes are held frequently in major U.S. cities. Lexis charges $32 per hour plus $10 to $23 per search, depending on the data base. There is a $125 minimum monthly billing. Access is via Telenet, Tymnet, and WATS at 1200 or 2400 bps.

Mead Data Central, Inc.
P.O. Box 933
Dayton, OH 45401
800/543-6862

Nexis

Nexis is a collection of over 300 full-text data bases from both domestic and international sources covering biography, business intel-

ligence, current events, industry, politics, and science. Nexis offers no SIGs or gateways and provides the same help, documentation, and training as Lexis.

Nexis charges $32 per hour plus $7 to $30 per search, depending on the data base. There is a $50 minimum monthly billing.

Mead Data Central, Inc.

Westlaw

Westlaw has over 1000 data bases that contain federal and state cases and statutes; federal bankruptcy, labor, securities, and tax forms and regulations; law review articles (dating from 1982); Insta-Cite; and *Shepard's Citations*.

Westlaw has gateways to Dialog, Dow Jones News/Retrieval, Information America, PHINet, and Vu/Text. On-line and voice help and a user manual are available. Westlaw classes are held daily in 20 cities throughout the United States and run $70 per person. Access is via local nodes, IBM Info-Net, Telenet, and Tymnet at 1200, 2400, 4800, or 9600 bps.

Westlaw offers two subscription plans. One, for higher volume subscribers, has a $125 monthly flat fee with connect charges of $130 per hour. The other plan has an $80 monthly minimum billing, and connect charges of $240 per hour. Both subscription plans have additional telecommunications and access charges of $10 to $20 per hour.

West Publishing Co.
50 W. Kellogg Blvd.
P.O. Box 64526
St. Paul, MN 55164
800/328-0109, 612/228-2737

DATA BASES

The following data bases are available through on-line services, through data base vendors, directly from the listed producer, or through a combination of the three. Prices are given for data bases that are available directly from the producer; see on-line service and data base vendor listings for vendor prices.

Aviation and Defense

Aviation Safety Institute

This full-text monthly newsletter that started in January 1982 offers tips for operating all types of aircraft, a regularly updated listing of general mechanical difficulties as reported by mechanics and pilots, safety tips, and a take-off simulator. Access: CompuServe (300, 1200, 2400 bps).

Aviation Safety Institute
P.O. Box 304
Worthington, OH 43085-0304
614/885-4242

Defense Daily

This 8-page daily newsletter covers the Pentagon, congressional appropriations bills, policies affecting space and defense, defense contract awards, foreign military sales, key personnel changes in the defense industry, and Soviet space and defense programs. Access: NewsNet (300, 1200, 2400 bps).

Phillips Publishing
7811 Montrose Rd.
Potomac, MD 20854
301/340-2100

Business Directories

Dun's Market Identifiers

A directory of 2 million mostly privately held U.S. businesses that have more than ten employees or $100,000 in sales, Dun's listings include name, address, phone number, description of business, amount of sales at each main location, and number of employees. Access: Dialog (300, 1200, 2400 bps).

Dun's Marketing Services
49 Old Bloomfield Ave.
Mountain Lakes, NJ 07046
800/223-1026, 201/299-0181

Forbes 500 Annual Directory

The directory ranks the 800 largest U.S.–based, publicly owned companies by sales, assets, profits, and stock market value. It also contains extensive stock market information on the 500 top-ranked companies. Access: Nexis (1200, 2400 bps).

Forbes
60 Fifth Ave.
New York, NY 10011
212/206-5505

Business Planning

Business Periodicals Index

The index covers corporate law, labor relations, taxation, real estate law, estate planning, and criminal law; it also offers full text of statutes, case notes, and book reviews. It provides an index to articles from 476 legal periodicals published in the United States, Canada, Great Britain, Ireland, Australia, and New Zealand. Access: Wilsonline (300, 1200, 2400 bps); $43 to $65 per hour, depending on volume.

The H.W. Wilson Co.
950 University Ave.
Bronx, NY 10452
800/367-6770, 800/462-6060
New York

CENDATA

CENDATA contains economic and demographic data for the United States and demographic data for more than 200 other countries. Monthly economic indicators, such as trade balance, retail sales, and housing-start figures are available minutes after release by the Commerce Department. Access: CompuServe, Dialog (300, 1200, 2400 bps).

U.S. Census Bureau
Washington, DC 20233
301/763-2074

Daily Report For Executives

Updated daily, this newsletter covers trends in tax policy, economics, export and import controls, antitrust and trade regulation, banking, agriculture, federal expenditure, international finance, product liability, securities regulation, energy developments, and environmental policy. Access: Dialcom (300, 1200, 2400 bps); Nexis, Westlaw (1200, 2400 bps).

Bureau of National Affairs
1231 25th St. NW
Washington, DC 20037
800/862-4636

Harvard Business Review/On Line

The on-line version of the bimonthly journal gives citations, abstracts, and full text of *Harvard Business Review* articles covering accounting, organizational behavior, industrial analysis, international trade, business ethics, marketing, computers, personnel relations, finance, time management, and advertising. Updated bimonthly. Access: BRS, Dialog, EasyNet (300, 1200, 2400 bps); Nexis (1200, 2400 bps).

John Wiley & Sons
605 Third Ave.
New York, NY 10158
212/850-6189

Careers

Career Placement Registry

According to the producer, 80,000 companies search this on-line rèsumè file and data base for prospective employees. Two hundred occupations are represented, and 80 percent of the people listed are college graduates. Access: Dialog (300, 1200, 2400 bps).

Career Placement Registry
302 Swann Ave.
Alexandria, VA 22301
800/368-3093

United States Employment Opportunities—The Computer Field

This directory shows career announcements at every level in the hardware and software industries nationwide. Trends and technological developments affecting employment opportunities in the computer field are also covered. Access: Delphi, NewsNet (300, 1200, 2400 bps).

Washington Research Associates
2103 N. Lincoln St.
Arlington, VA 22207
703/276-8260

Computer Industry

Andrew Seybold's Outlook on Professional Computing

Seybold's monthly, full-text publication of technical evaluations and reviews of hardware and software is geared for the nontechnical business person. The editorial slant is toward the application of personal computers in a corporate environment. Access: direct (300, 1200 bps); $30 per month; NewsNet (300, 1200, 2400 bps).

Infotechnology Publishing Corp.
3235 Kifer Rd. #110
Santa Clara, CA 95051
408/746-2555

Business Software Database

A directory of more than 10,000 micro, mini, and mainframe computer software packages, this data base lists program title, vendor name and address, company contact, and a detailed description of features. Access: BRS, Dialog, EasyLink (300, 1200, 2400 bps).

Information Sources
1173 Colusa Ave.
P.O. Box 7848
Berkeley, CA 94707
415/525-6220

Microcomputer Index

Abstracts of and index to 70 microcomputer periodicals can be searched by article title, author, keyword, subject heading, product name, or company name. Access: Dialog (300, 1200, 2400 bps).

Database Services
2685 Marine Way #1305
Mountain View, CA 94043
415/961-2880

Newsbytes

This award-winning weekly news wire provides microcomputer industry news, editorials, and trade show coverage from bureaus in Atlanta, New York, San Francisco, Washington, DC, Brussels, London, Tokyo, Toronto, and other sources worldwide. Access: The Source (300, 1200, 2400 bps).

Newsbytes News Service
822 Arkansas St.
San Francisco, CA 94107
415/550-7334

Finance

Bizdate

This on-line source provides business and investment news summaries, stock market and currency reports, investment tips, and newsletters on the oil industry, banking, and real estate. Market reports include a weekly summary of mergers and acquisitions. Access: The Source (300, 1200, 2400 bps).

Source Telecomputing

Citibank Global Report

Citibank's international data base reports corporate and industry information on every major market worldwide, such as money markets, foreign exchange, stocks, bonds, futures, options, and mutual funds. News and rates are reported in real time. Access: direct (300, 1200, 2400 bps); $90 per hour, with volume discounts available.

Citicorp
One Citicorp Center
153 E. 53rd St., 3rd floor, Zone 2
New York, NY 10043
800/842-8405

SEC Online

This data base contains the full text of corporate annual reports, forms 10K and 10Q, proxy statements, SIC codes, investor contacts, and corporate legal counsel and stock agents for all companies on file with the Securities and Exchange Commission. Access: Nexis, Lexis, Westlaw (300, 1200, 2400 bps).

SEC Online
400 Oser Ave.
Hauppauge, NY 11788
516/434-9000

Standard & Poor's News On Line

This on-line edition of a basic business source contains financial news and statistics on approximately 12,000 publicly held corporations, including all of the companies listed on the New York Stock Exchange, American Stock Exchange, and NASDAQ, plus all initial public offerings. Access: Citibank Global Report (described in this section), Dialog (300, 1200, 2400 bps).

Standard & Poor's Corp.
25 Broadway
New York, NY 10004
212/208-8622 (accepts collect calls)

General Reference

Books In Print

Contains 1 million bibliographic references (indexed by Library of Congress classifications) to forthcoming books, and books both in and out of print since 1979, from 16,000 English language publishers. Access: BRS, Dialog (300, 1200, 2400 bps).

R.R. Bowker Co.
245 W. 17th St.
New York, NY 10011
800/323-3288, 212/337-6989

Encyclopaedia Britannica

The oldest and most comprehensive encyclopedia in the English language, it's over 44 million words long. Approximately one-third of the material consists of short articles; the remaining two-thirds contains long, general articles that are theoretical and comparative in nature. Access: Nexis (1200, 2400 bps).

Encyclopaedia Britannica
310 S. Michigan Ave.
Chicago, IL 60604
312/347-7000

The Readers' Guide to Periodical Literature

The basic library source on popular periodicals indexes articles in 182 popular publications from 1983 to the present, covering current events, business, fashion, politics, crafts, food, education, sports, history, and science. It is organized by subject and periodical. Access: Wilsonline (300, 1200, 2400 bps).

The H.W. Wilson Co.

Insurance

Insurance Databases

Covering federal and state case law and statutes pertaining to insurance for 21 states and Guam, this on-line source also contains law reviews, texts, and bar association journals relating to insurance. Access: Westlaw (1200, 2400 bps).

West Publishing Co.

Insurance Periodicals Index

Targeted at brokerage houses and insurance company managers, this data base indexes and abstracts 38 insurance business journals and adds 13,000 new records each year. Access: Nexis, Lexis (1200, 2400 bps).

NILS Publishing Company
P.O. Box 2507
Chatsworth, CA 91311
800/423-5910, 818/998-8830

Law

American Bar Association (AMBAR)

AMBAR is a collection of abstracts from eight American Bar Association journals, covering a wide range of law topics, as well as abstracts of articles, monographs, and pamphlets on the activities, programs, and research of the American Bar Association. Access: direct (300, 1200, 2400 bps); $16 per hour 8 a.m. to 5 p.m., $11 per hour at other times, plus $19 per hour data base royalty fee, one-time fee of $50 to join, and annual fee of $50 to ABA members ($150 to nonmembers).

American Bar Association Information Services
750 North Lakeshore Dr.
Chicago, IL 60611
800/621-6159, 312/988-5158

News

AP Online

The Associated Press's on-line news wire covers the top stories in national and international news, and provides headline updates, news briefs, stock market news, and sporting event scores hourly, and Dow Jones updates every 30 minutes. Access: CompuServe, Delphi, Dialcom, The Source (300, 1200, 2400 bps).

The Associated Press
50 Rockefeller Plaza
New York, NY 10020
212/621-1500

The New York Times

This on-line news service includes every article published in the *New York Times* since June 1980, covering local, national, and international news; business; real estate; computers; the stock market; fine arts and the performing arts; and reviews. Access: Nexis (1200, 2400 bps).

The New York Times
229 W. 43rd St.
New York, NY 10036
800/543-6862, 212/556-1234

Taxation

PHINet

Targeted at accounting firms, law firms specializing in taxation, and the IRS (its biggest customer), PHINet offers daily tax news, analysis, and commentary, as well as more than 30 tax-related data bases. Access: direct (1200, 2400 bps) $100 per hour, $50 monthly fee, $1200 one-time sign-up fee.

Prentice Hall Information Network
One Gulf & Western Plaza
New York, NY 10023-7774
212/373-8600

The Tax Directory

This source lists the names, addresses, and phone numbers of federal and state taxation agencies and officials, courts and judges, as well as journalists, special interest groups, and private individuals associated with taxation. Access: Lexis, Westlaw (1200, 2400 bps); NewsNet (300, 1200, 2400 bps).

Tax Analysts
6830 N. Fairfax Dr.
Arlington, VA 22213
800/336-0439, 703/532-1850

Trade

International Trade Reporter

This weekly report covers domestic and foreign trade policy and U.S. legislative, regulatory, and judicial actions affecting the international trade and foreign commerce communities. Access: Lexis, Westlaw (1200, 2400 bps).

Bureau of National Affairs
1231 25th St. NW
Washington, DC 20037
800/862-4636

Trade and Industry Index

This general trade index contains profiles of prominent businesspeople and corporate intelligence on companies, products, consumer and industry trends, investments, and mergers and acquisitions, as well as pertinent citations to more than 600 trade and management journals. Access: Dialog (300, 1200, 2400 bps).

Information Access Corp.
357 Lakeside Dr.
Foster City, CA 94404
800/227-8431

Scott Spanbauer is an assistant editor for PC World. *Abigail Sheiner performed the research for this article.*

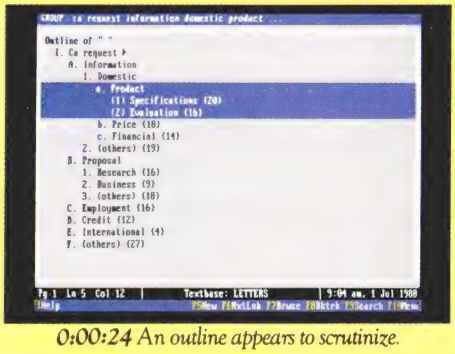
SPEND 200 SECONDS WITH AN IZE® USER.

When a new kind of software is released, some explaining needs to be done. In the case of IZE, a quick demonstration is the best explanation.

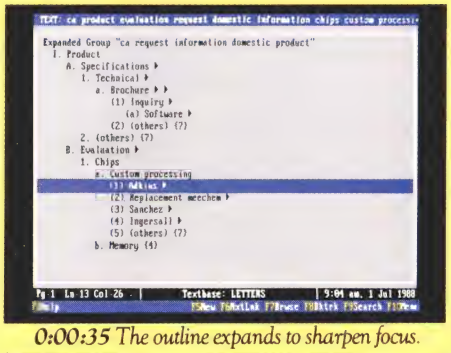
Picture an executive opening her IZE and requesting an outline of letters responding to inquiries for information written to contacts in California. Based on the request, her complete collection of letters is searched. IZE finds 190 information response letters to addressees in California.

0:00:05 With IZE open, a request is made.

0:00:17 In seconds, IZE organizes the facts.



0:00:24 An outline appears to scrutinize.

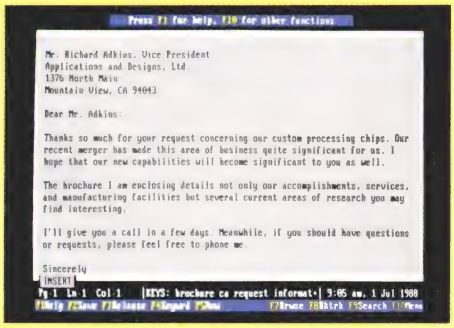


0:00:35 The outline expands to sharpen focus.

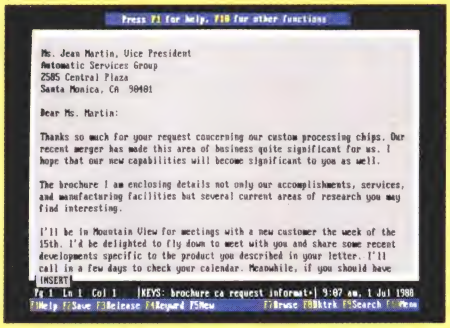
From the IZE outline, our executive can quickly find what she needs. An in-depth outline guides her to precisely what she is looking for. One keystroke presents the letter she was seeking. It's now simple, using IZE word processing features, to customize the letter she found for the current task.

A call brings a request for some sales projections. IZE will find them fast even in other applications.

The executive simply hot links directly from IZE to a spreadsheet document. The figures are found and the question answered. Returning to the customized letter, the executive gives it a final look, prints it, and moves on.



0:01:01 The facts are found ready to revise.



0:03:20 A new, customized letter is ready to print.

If these 3 minutes and 20 seconds of productivity are something you'd like to see more of, don't waste time before taking the next step.

Visit a dealer for a longer demonstration or phone us at 608-273-6000 and realize the power of IZE.

IZE MAKES INFORMATION MANAGEABLE.

persoft®

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- ☐1 game port
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- ☐1 parallel port
- ☐Switchable AT/XT keyboard
- ☐Samsung amber monochrome monitor
- ☐Hardware reset switch
- ☐8087 co-processor ready
- ☐Hardware turbo switch
- ☐Audio speaker
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- ☐48 hour hardware burn-in and diagnostic testing period
- ☐Comprehensive 1 year parts and labor warranty

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30 MB Hard Drive Kit Add: $298	$921
40 MB Hard Drive Kit Add: $373	$996

DISCOUNT MICRO BASE SYSTEM $623

12 MHz WITH ZERO WAIT STATE. 286 BASED SYSTEM

STANDARD FEATURES:

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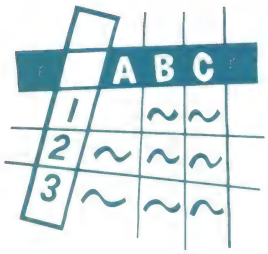

Spreadsheets

Richard Scoville

Good design is logical, orderly, and effective. Most software that rises to the position of industry standard does so, in part, because its menu design is hierarchical, lucid, and efficient. *1-2-3*, for example, is renowned for its coherent menu system, which simplifies navigation and reduces the learning curve.

If you've already cut your teeth on *1-2-3*, you can take its built-in ease of use a step further. *1-2-3*'s macro-programming language enables you to create custom menus for your own applications. By automating worksheets, custom menus can save time and ease frustration, particularly for new *1-2-3* users and those who find themselves plowing through the same worksheets over and over.

Menu Design 101

Three principles are basic to creating well-designed menus. First, menus must maintain control of the application. Users should be restricted to just the input and analysis routines you have planned, while novices should receive clear on-screen guidance. Every necessary worksheet function should be governed by the macro; no inadvertent action should derail it.

Second, custom menus should look and "feel" like regular *1-2-3* menus: They should allow users to select options either by pointing or by pressing first letters (like *P* for Print), and to back up to previous menus using the <Esc> key.

Finally, like all good computer programs, your menu macros should also be easy to read and change. The techniques presented here allow you to alter

menus by inserting or deleting simple modular elements, with little or no adjustment required.

Basic Menu Commands

You can set up a menu using one of two menu commands: {menubranch} or {menucall}. At first glance the two commands appear similar: Each allows your custom menu to be displayed in the control panel, pauses while the user selects a menu option, then executes the macro commands that option requires.

But there's an important difference. With {menubranch}, *1-2-3* processes the macro and then ends it after the last macro command unless you add {branch} commands that provide further processing instructions. With {menucall}, *1-2-3* processes the last macro command, then returns control to the command in the cell under {menucall} so the macro remains active. You can create similar menus with either command, but {menucall} is much more convenient when you need to build complex multilevel menus (like *1-2-3*'s own), where a menu option can lead to a series of submenus.

The syntax for the menu commands is {menubranch *location*} and {menucall *location*}; *location* refers to the name of the range

```
IBM  HP-Laser
Select printer
        A            B                C        D        E
1
2   \M          {menubranch M_MENU}              ; Display menu
3
4
5   M_MENU      IBM              HP-Laser        ; Menu options
6               Select printer   Select printer  ; Menu prompts
7               /wgdpn1qq        /wgdpn2qq       ; Commands
8
9   M_MENU      B5
10  \M          B2
```

FIGURE 1: Here's the simplest menu you can create. The command {menubranch} displays the two menu options, IBM and HP-Laser, in the control panel; when you make your selection, the Worksheet Global Default Printer command executes. The menu will not redisplay unless you press <Alt>-M.

in which the menu macro begins. The range name identifies only the upper left corner cell of the macro. Therefore, you can conveniently edit a menu macro without adjusting its range name.

Unlike *1-2-3*'s own menus, your custom menu may only contain up to eight options (with a maximum of 66 characters). You should begin each menu option with a different character so users can make first-letter selections. Otherwise, if two options begin with the same letter, pressing that letter selects only the first option.

Creating a Simple Menu

Figure 1 illustrates the simplest possible menu. When you press <Alt>-M, the menu appears in the control panel as shown, prompting you to select either an IBM or HP printer. If you select 'IBM', the macro executes the command in cell B7 (/Worksheet Global Default Printer Name 1 Quit Quit), which selects an installed printer. Selecting 'HP-Laser' directs the macro to a similar command in cell C7. After the printer command executes, the macro stops—that is, the menu does not reappear—and *1-2-3* returns to READY mode.

Note that the format used in Figure 1 is similar for all menus, no matter how complex. The {menubranch} command in cell B2 tells *1-2-3* to display the menu located at the range M_MENU, which begins in cell B5, the upper left corner of the menu. The menu options 'IBM' and 'HP-

```
Input  Print  Exit
Enter loan data
          A                B                C                D        E        F
1        Principal:      $100,000
2     Interest rate:          9%
3      Years to pay:         25
4
5   Monthly payment:       $839.20
6    Total payments:      $251,759
7    Total interest:      $151,759
8  ------------------------------------------------------------------------------------
9
10 \M                 {menubranch M_MENU}                                  ; Display menu
11                    {branch \M}                                          ; Trap <Esc> key
12
13 M_MENU             Input              Print                   Exit      ; Menu options
14                    Enter loan data    Print report            Leave macros ; Menu prompts
15                    /riLOAN_IN~        {calc}/ppcarLOAN_PRN~agpq {quit}  ; Option commands
16                    {branch \M}        {branch \M}                       ; Loop to main menu
17
18 LOAN_IN            A1..B3
19 LOAN_PRN           A1..B7
20 M_MENU             B13
21 \0                 B10
22 \M                 B10
```

FIGURE 2: This menu is more controlled. After you select either Input or Print and 1-2-3 executes the macro commands, the {branch} commands in cells B16 and C16 pass control to {menubranch}, which restarts the macro.

Laser' appear in cells B5 and C5. Finally, just below the options are the menu option descriptions that tell the user what each menu option does (in this case, 'Select printer'). The macro commands that will be executed once the user chooses a menu option must begin in the cell below that option's explanation; in this example, cells B7 and C7. A range table in cells A9..B10 documents the macro, and brief descriptions of what the commands do appear in column E. Column D is intentionally left blank so that the descriptions do not display as part of the menu options.

SETTING UP THE MACRO IN FIGURE 1

1. Enter the labels.
Type in the labels exactly as shown in Figure 1. (Macros are always stored in the worksheet as labels.) Because the macro keystrokes in cells B7 and C7 begin with the slash character, you'll need to type a label prefix (') first.

2. Name the ranges.
Place the cell pointer on cell B2, which contains the starting macro command {menubranch M_MENU}, select */Range Name Create*, and enter the macro range name **M**. Follow the same procedure to give the range name M_MENU to cell B5.

3. Execute the macro.
Use <Alt>-M to put the macro to work. Of course, you must have the appropriate printer drivers installed for this macro to work properly.

Getting a Menu Under Control

Although the menu in Figure 1 works smoothly, it lacks control: The macro ends once the user has selected an option. For a macro that guides the user more closely, you can use the looping technique shown in the worksheet in Figure 2, which uses {branch} commands to loop the macro back onto itself. As a result, the menu redisplays after every selection (except for Exit).

The worksheet is a simple loan calculator that could be used in a real estate office to answer the question every potential home buyer asks: "How much will my monthly payments be?" The worksheet allows a real estate agent to enter the loan assumptions, calculate the monthly payment and total interest, and print a simple report.

In Figure 2, cells B1, B2, and B3 are data entry cells containing the principal amount, the yearly interest rate, and the term of the loan (in years), respectively. The formula in cell B5 figures the monthly payment, cell B6 calculates the total amount paid over the term of the loan, and cell B7 subtracts the principal from cell B6 to find the total interest paid.

What distinguishes this macro from the one in Figure 1 is that it's a closed loop: All worksheet functions are controlled by menu options. The menu reappears after each Input or Print operation, ready for the next. As long as the macro is active, the user's actions are limited to entering new loan assumptions or printing a report.

Here's how it works. The {menubranch} command in cell B10 displays the menu options lo-

JUST PRESS <ESC>

The 1-2-3 menu system is tree-structured, with many options leading to submenus and sub-submenus. Pressing <Esc> usually gets you back to the last menu you visited in the tree. This seems natural to experienced 1-2-3 users, but engineering it into an application macro takes a bit of doing.

Figure A presents a general model for multilevel menus that behave just like regular 1-2-3 menus. Its modular structure makes it easy to build and change. Since the model is organized with {menucall}, processing flow is controlled by its subroutine structure, and adding or even moving a menu option from one menu to another is simple and routine. You can expand this model up to 31 menus deep.

The trick is to replace any menu option's subroutine call with a {menucall} command. Each option should also end with a {return} command, so after the user makes a menu selection or presses <Esc>, macro processing can "climb" back through the menu levels toward the main menu. With subroutines, you can insert a {menucall} in any menu option and the macro will still work properly.

Figure A illustrates several types of submenu options; each behaves slightly differently. The Advance options in column B call submenus using {menucall} commands. The Execute & Remain options in columns B and C are set up to execute a subroutine and then redisplay the current menu. Finally, the Execute & Return options in columns C and D call a subroutine and then return to the previous menu.

Here's how the menus work. When you select Main-1 from the first menu, the {menucall} in cell B6 displays the submenu at M_SUB1 (beginning in cell B9). Then if you press <Esc>, the {return} in cell B7 executes, and processing passes back to the {branch} in cell B2 and then on to the original main menu via {menucall} in cell B1.

Now examine the submenu at M_SUB1. The {menucall} under option Sub1-1 (cell B11) presents the next nested menu, M_SUB2. The next {menucall} (cell B12) functions like the {branch} command in cell B2; it redisplays M_SUB1 when you press <Esc> from M_SUB2. This second {menucall} also executes whenever processing returns to M_SUB1 from the menu below.

The second menu option, Sub1-2 (which will Execute & Remain), is similar to the first; but instead of displaying a submenu, it processes a subroutine (represented here by the dummy subroutine {CODE}, which sounds a high tone on the PC's speaker). After {CODE} executes, its {return} command passes processing to the {menucall} in cell C12, which redisplays M_SUB1.

Next, Sub1-3 (which will Execute & Return) eliminates the {menucall}; when its dummy subroutine is processed, the {return} in cell D12 passes control back to cell B1 via the {return} in cell B7 and the {branch} in cell B2. Finally, the Quit option in cell E9 simply executes a {return} to move back up the subroutine ladder.

Further submenus follow the same pattern, as shown in M_SUB2 and M_SUB3. Because of the modular structure possible with {menucall}, these menus are relatively easy to create and edit. —*R. S.*

```
Main-1  Main-2  Exit
Advance
        A          B                C                D                E
1   \M         {menucall M_MAIN}
2              {branch \M}
3
4   M_MAIN     Main-1             Main-2             Exit
5              Advance            Execute & Remain   Exit Macros
6              {menucall M_SUB1}  {CODE}             {quit}
7              {return}           {return}
8
9   M_SUB1     Sub1-1             Sub1-2             Sub1-3             Quit
10             Advance            Execute & Remain   Execute & Return   Retreat
11             {menucall M_SUB2}  {CODE}             {CODE}             {return}
12             {menucall M_SUB1}  {menucall M_SUB1}  {return}
13             {return}           {return}
14
15  M_SUB2     Sub2-1             Sub2-2             Sub2-3             Quit
16             Advance            Execute & Remain   Execute & Return   Retreat
17             {menucall M_SUB3}  {CODE}             {CODE}             {return}
18             {menucall M_SUB2}  {menucall M_SUB2}  {return}
19             {return}           {return}
20
21  M_SUB3     Sub3-1             Sub3-2             Quit
22             Execute & Remain   Execute & Return   Retreat
23             {CODE}             {CODE}             {return}
24             {menucall M_SUB3}  {return}
25             {return}
26
27  CODE       {beep 3}
28             {return}
29
30  \M         B1
31  M_MAIN     B4
32  M_SUB1     B9
33  M_SUB2     B15
34  M_SUB3     B21
35  CODE       B27
```

FIGURE A: This multilevel menu system lets you back up to previous menus by pressing <Esc>.

cated in cells B13..D13. Under the Input option, cell B15 controls data entry with the command Range Input. Range Input makes the macro pause for data entry only in the cells within the range LOAN_IN that have been "marked" for data entry with Range Unprotect (cells B1..B3). (Note that after making the entries, you must press <Enter> or <Esc> to redisplay the menu.) The Print option executes cell C15, which recalculates the worksheet and then prints a report using /Print Printer Clear All Range LOAN_PRN <Enter> Align Go Page Quit.

Notice that the macros for both menu options (cells B16 and C16) end with the command {branch \M}, which returns the macro to cell B10 (\M) to restart the menu and thus close the loop. An Exit option has been added to the menu (cells D13..D14) as an "escape hatch"; selecting Exit stops the macro with the command {quit} in cell D15.

This macro illustrates two additional control structures that help guide the user. First, the macro is self-starting: It begins running automatically when the worksheet is retrieved. Naming the starting cell—here cell B10—with the special range name \0 (zero) creates a self-starting macro. Actually, cell B10 has two range names, \M and \0; since you can't execute a macro by pressing <Alt>-0, you must give the macro another, executable range name to use during construction and debugging—hence \M.

Second, the worksheet in Figure 2 traps the <Esc> key. If you press <Esc> instead of making a menu selection while {menubranch} is displaying the menu, the macro "drops" to the {branch} instruction under the

```
Input  Print  Exit
Enter loan data
          A                    B                C          D          E          F
1          Principal:        $100,000
2      Interest rate:              9%
3       Years to pay:             25
4
5    Monthly payment:         $839.20
6     Total payments:        $251,759
7     Total interest:        $151,759
8   ------------------------------------------------------------------------------
9
10  \M                {menucall M_MENU}                                  ; Display menu
11                    {branch \M}                                        ; Trap <Esc>, restart
12
13  M_MENU            Input              Print          Exit             ; Menu options
14                    Enter loan data    Print report   Leave macros     ; Menu prompts
15                    {INPUT}            {PRINT}        {quit}           ; Subroutine calls
16                    {return}           {return}                        ; Return to main menu
17
18  INPUT             /riLOAN_IN~                                        ; Input data
19                    {return}                                           ; Return to menu
20
21  PRINT             {calc}                                             ; Recalc worksheet
22                    /ppcarLOAN_PRN~agpq                                ; Print report
23                    {return}                                           ; Return to menu
24
25  INPUT             B18
26  LOAN_IN           A1..B3
27  LOAN_PRN          A1..B7
28  M_MENU            B13
29  PRINT             B21
30  \0                B10
31  \M                B10
```

FIGURE 3: This menu works like the one in Figure 2, but subroutines make it easier to read and edit. For example, {PRINT} (cell C15) calls a subroutine that begins in cell B21, which recalculates the worksheet, prints a report, and then redisplays the menu.

{menubranch} command. In Figure 1, there is no instruction under {menubranch}, only an empty cell, so pressing <Esc> terminates that macro. In Figure 2, the {branch} command in cell B11 "traps" the <Esc> key and returns processing to the macro. Thus, the only way out (short of pressing <Ctrl>-<Break>) is through the Exit menu option. The macro maintains control.

SETTING UP THE MACRO IN FIGURE 2

1. Enter the labels and formulas.

Type in the labels as shown in Figure 2. Then, in cell B5, type **@PMT(B1,B2/12,B3*12)**; in cell B6, use **+B5*B3*12**; in cell B7 enter **+B6 – B1**.

2. Create the named ranges.

The ranges are documented beginning in cell A18. To name the range LOAN_IN, for example, put the cursor on cell A1, use */Range Name Create*, enter the range name **LOAN_IN**, highlight the range A1..B3, and press <**Enter**>. (Note that the /Range Input command in cell B15 will align LOAN_IN—the input range—at the leftmost corner of the screen. So that the labels in cells A1..A3 are displayed during data entry—and to avoid a disconcerting movement of the screen—the range LOAN_IN includes cells A1..A3, not just the data entry cells B1..B3.) Repeat the naming process for the remaining ranges.

3. Mark cells for data entry.

Simply place the cell pointer on cell B1 and, using */Range Unprotect*, highlight range B1..B3 to mark those cells as data entry

cells. (Range Input will limit cursor input to unprotected cells in that range.)

4. Document the macro.
Leave column E blank, but add the descriptions in column F to document the macro.

5. Run the macro.
Use <Alt>-M, or simply save and retrieve the worksheet to start the macro automatically.

How to Use Subroutines

The menu structure in Figure 2 works well with {menubranch} and {branch}, provided that each command option is short and simple, like those in cells B15 and C15. In a more realistic worksheet, however, each option may have a long, complex sequence of commands. Reading, editing, and annotating such a macro is awkward. For example, when the commands lie in adjacent columns, you can't use */Worksheet Insert Row* or */Worksheet Delete Row* to edit the macro.

A simple solution to this problem is illustrated in Figure 3. Although the macro in Figure 3 works just like the one in Figure 2, it is organized into subroutines, which are easier to read and edit. A subroutine is a sequence of macro commands, set apart from the main flow of the macro, that can be called (i.e., executed) whenever it is needed. The command that calls a subroutine is simply the range name of the subroutine's starting cell, placed in braces to form a macro command: for example, {INPUT}.

A subroutine call acts much like a {branch}; it transfers macro processing to another cell. The difference is that a subroutine call ends with a {return} command that automatically takes macro execution back to the cell directly under the subroutine call—that is, back into the main flow of macro control.

In Figure 3, the Input and Print menu options and their prompts in cells B13..C14 are followed by subroutine calls in cells B15 and C15. The commands in those cells are the range names of the cells that begin the instructions for data input (cell B18) and printing (cell B21). If the user selects Print, for example, the macro executes the {PRINT} subroutine call in cell C15; processing then passes to cell B21, which begins the range named PRINT, and the report is printed.

The subroutine structure in Figure 3 extends to the menu command itself. Figure 2's <menubranch> has been replaced with <menucall> (cell B10), a command that works much like the subroutine call. It treats the menu itself as a subroutine. For instance, notice that the Input option terminates with a <return> in cell B16. When the subroutine <INPUT> is complete, <return> in cell B19 sends the macro back to the <return> in cell B16, which in turn sends the macro to the <branch> command in cell B11, which returns to the original <menucall> in cell B10, thus closing the menu loop. Here the <branch> serves two functions: It traps the <Esc$> key and restarts the macro after each menu selection.

SETTING UP THE MACRO IN FIGURE 3

1. Enter the labels and formulas.
Type in the labels as shown in Figure 3; the formulas in cells B5, B6, and B7 are the same as those in Figure 2.

2. Create the named ranges.
Name the ranges listed in the range table beginning at cell A25.

3. Mark cells for data entry.
Select */Range Unprotect* and highlight the range B1..B3 to mark those data entry cells.

4. Document the macro.
Type in the descriptions shown in column F, leaving column E blank.

5. Use the macro.
Simply press <Alt>-M.

How to Nest Menus

With simple menus you can stop there. These menuing techniques—loops, subroutines, auto-execution with \0, <Esc> trapping, and escape hatches—will make your menus easier to set up and use. However, you can also go a step further and create nested menus like those in *1-2-3*. The sidebar "Just Press <Esc>" shows you how to make menus that users can back out of by doing just that: pressing <Esc>. For complex worksheets in particular, custom menus provide helpful guidance, allowing users to accomplish routine tasks more easily. ●

Richard Scoville is director of training for the Computer Gallery in Research Triangle Park, North Carolina.

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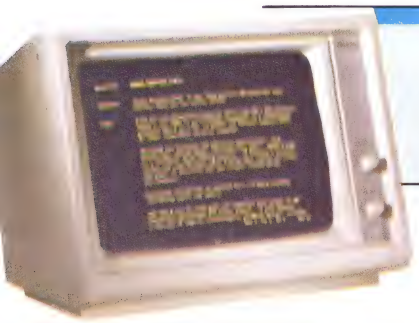

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CONSUMER WATCH

Advice and information for the computer consumer

Need some PC-related advice? User groups can provide information and solve problems for users of all stripes.

Edited by Anita Amirrezvani

ANTHONY RUSSO

Is your word processor saving files in Greek? Does your hard disk sound like a B-17 taking off? And is your friendly vendor or local dealer less than helpful?

Stop gnashing your teeth and join a user group. These federations of dedicated expert users can often unravel a knotty software or hardware riddle in short order—and they do it simply for the love of computing. Steve Rowan, president of the Southwest PC Users Group in Louisville, Texas, recalls how members rallied around a neophyte who couldn't get a brand-new machine to boot up. The club's question-and-answer session uncovered the problem: The dealer sold the man the wrong version of DOS for his machine. "When a dealer doesn't know what he's doing," Rowan says, "who's a beginner going to turn to?"

User groups exist solely to share information and lend a helping hand to PC voyagers. Consumer-oriented services include not only on-the-spot assistance but monthly newsletters, telephone technical support, training, and education. Club newsletters are chock-full of hints and tricks and product reviews that don't pull punches. (In fact, when major manufacturers such as IBM want to solicit opinions on new products, they often call on user groups first.) Some groups have PC gurus dedicated to application- and system-specific problems. Training and education usually take the form of instructional seminars and vendor presentations at monthly meetings.

Sometimes, it isn't even necessary to be a group member to get emergency help. After a major fire in downtown Los Angeles burned a small company's hard disk to a crisp, the owner called the Pasadena IBM Users Group for help. A group member put the user in touch with a firm that specializes in restoring fire-damaged hard disks. "We get frantic phone calls at all hours from all over the country," says Steve Bass, club president, "and we'll help any nonmember."

How can you find a user group? A good place to start is with the list of user groups that follows. National and local computer magazines are another source, and dealers and vendors may also steer their customers to local groups. IBM, for example, has a service that catalogs PC user groups by ZIP code or telephone area code. Just call 404/988-2782, tap in the proper code, and the computerized voice-messaging system provides all the details you'll need.
—Wes Nihei

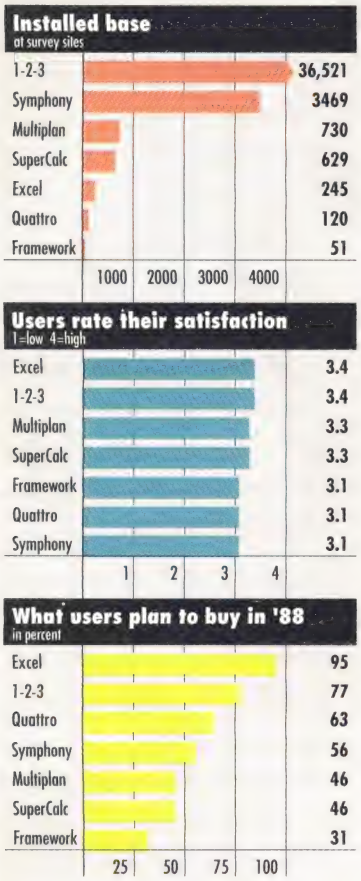
Wes Nihei is an assistant editor for PC World.

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, *page 4.*
(continues)

RATE YOUR SATISFACTION: Spreadsheets

Want to find out what users really think about PC products? Starting this month, *Consumer Watch* presents user satisfaction ratings from an ongoing survey by International Data Corporation.

This month's graphs on spreadsheets tell an interesting tale. Although *1-2-3* continues to dominate the market, a strong new contender has joined the fray: *Excel*. Its installed base among surveyed organizations is low, but current users rate it as highly as *1-2-3*. The upshot? Of those surveyed, 95 percent plan to buy *Excel* this year, compared to *77* percent for *1-2-3*.



Source: International Data Corporation. From a survey conducted in February 1988 of 185 sites, each with at least 50 PCs.

User group information code:

NL: Newsletter
SIG: Special Interest Group
TS: Technical Support
TE: Training and Education
BBS: Bulletin Board System

(User groups are listed in alphabetical order by state and city.)

ALASKA

Alaska Computer Society
2042 E. Third Ave.
Anchorage, AK 99501
907/277-2406
$25/yr., NL, 1 SIG, TS, TE

Polar PC User Group
c/o Glen Wilcox
P.O. Box 72934
Fairbanks, AK 99707
907/456-2500
$10/yr., NL

ALABAMA

Birmingham IBM PC User Group
c/o Fred Hilbers
P.O. Box 19248
Birmingham, AL 35219-9248
205/871-1939
$20/yr., NL, 15 SIGs, TS, TE

Huntsville IBM PC User Group
P.O. Box 16013
Huntsville, AL 35802
205/539-5940
$15/yr., NL, 1 SIG, TS, TE

Montgomery PC Users Club
c/o Tony Drake
3505 McGehee Rd.
Montgomery, AL 36111
205/281-6100
$25/yr., NL, 1 SIG, TS, TE, BBS

ARIZONA

Phoenix PC Users Group
P.O. Box 44150
Phoenix, AZ 85064
602/954-7519,
602/275-5558 (BBS)
$40/yr., NL, 2 SIGs, TS, TE, BBS

Tucson IBM PC Users Group
P.O. Box 1489
Tucson, AZ 85702
602/795-9437
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ARKANSAS

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Razorback PC Club
c/o Mark Penny
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Little Rock, AR 72203
501/225-8288
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Gold Country PC Users Group
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Berkeley PC/Compatibles User Group
c/o Mel Mann
1145 Walnut St.
Berkeley, CA 94707
415/526-4033
No fee, TS, TE, BBS

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17982 Walnut Rd.
Castro Valley, CA 94546
415/537-9899
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c/o Steven Bass
711 E. Walnut St. #306
Pasadena, CA 91101
818/795-2300
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Riverside, CA 92509-5339
714/685-5407
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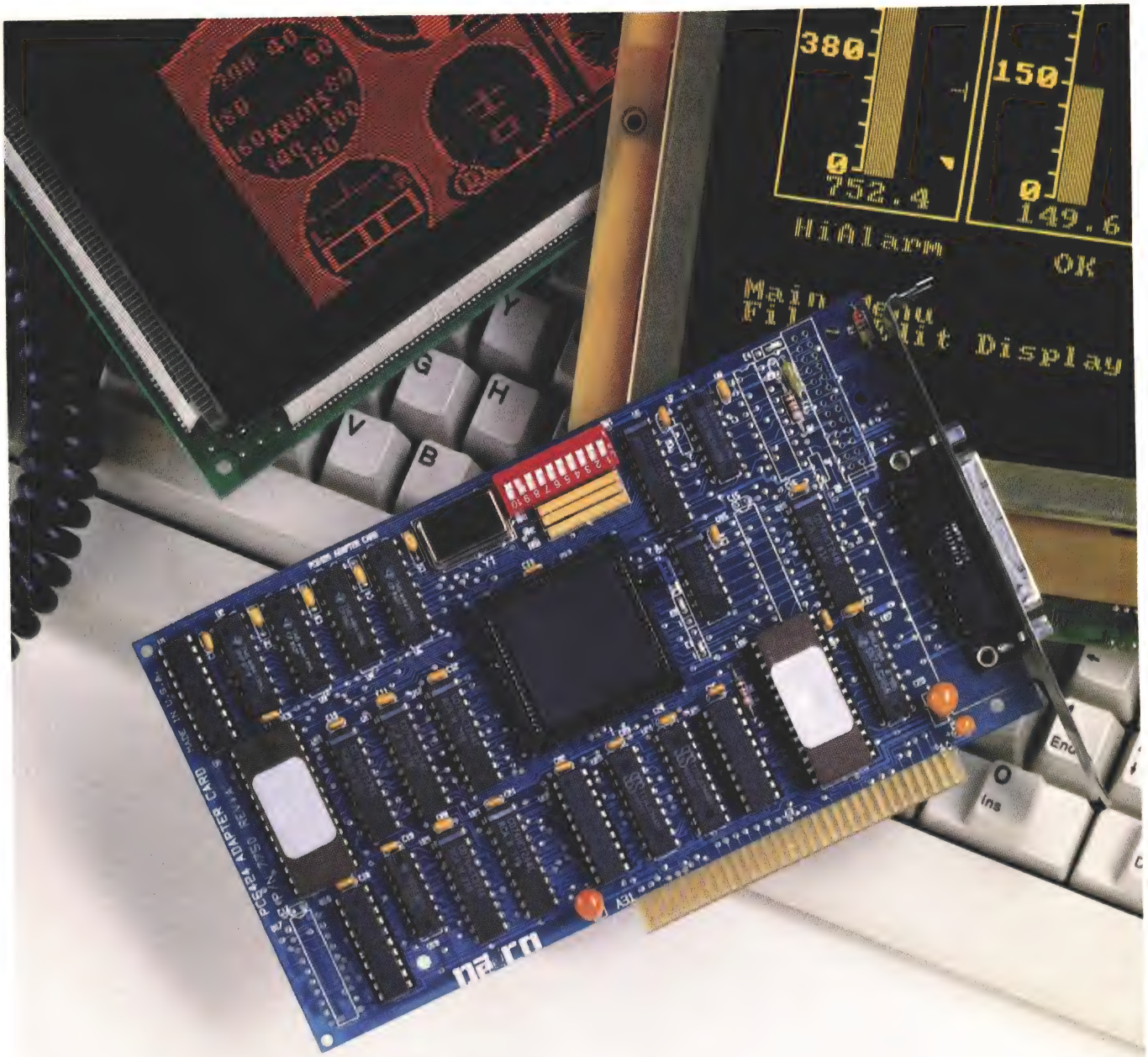

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404/446-6611
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THE UPGRADE PATH

Hands-on advice for upgrading PCs, compatibles, and peripherals

The Tandy 1000 transformation, 1.44MB drives for the PC and AT, and more

Edited by Robert Luhn

ANTHONY RUSSO

The Tandy 1000 Express

Sooner or later, almost everyone who uses an 8088 machine wonders if an 80286 turbo board could give the old box a new lease on life. But if you owned a member of the popular Tandy 1000 clan, you were out of luck. Although the Tandy 1000 is largely software compatible with the IBM PC, it isn't hardware compatible. The Tandy 1000 can't hold full-length (13-inch) expansion boards, and key internal circuitry doesn't conform to the PC standard.

Fortunately, your luck just got better. Tandy Corporation now offers the 286 Express board, specially designed by PC Technologies for the Tandy 1000, 1000 A, and 1000 SX. The board sports an 8-MHz 80286 processor, a socket for the 80287, and a place for the system's aged 8088, so you can downshift to 4.77-MHz processing for old, finicky programs. For an extra performance boost, the board's equipped with a high-speed 8K RAM cache.

Installation is relatively painless, thanks largely to PC Technologies' well-written and copiously illustrated manual. You relocate the Tandy's 8088 to a special daughterboard that snaps into the 286 Express, pop a plug attached to the daughterboard into the 8088's socket, and slip the 286 Express into a free slot. If you've never upgraded your system before, read the Tandy 1000 and 286 Express manuals completely before you start. As with most turbo board upgrades, you'll need a small flat-blade screwdriver and a Phillips screwdriver, a chip puller (for removing the 8088), and needle-nose pliers in case you have to straighten the 8088's pins. Note: If you're upgrading an original Tandy 1000 (not a model 1000 A), you must obtain a different daughterboard from Tandy.

Before you pull the 286 Express out its wrapper, copy the supplied EXPRESS.SYS device driver to the system's boot disk. To activate the cache and the ability to switch between the 80286 and 8088, add DEVICE = EXPRESS.SYS CPU CACHE to the Tandy's CONFIG.SYS file. Later, when the Tandy is up and running, you can turn the cache on and off by pressing <Alt>-<Right Shift> and switch processors using <Alt>-> and <Alt>-<.

Next, ground yourself, place the 286 Express on top of its antistatic wrapper, and locate the DIP switch block in the upper left corner. Follow the manual's instructions and indicate whether the board holds a 6-MHz or 8-MHz 80287 and whether a Tandy 1000 SX is the machine to be

(continues)

upgraded. Finally, turn off the computer, unplug all external cables, and remove the two screws at the front of the unit so you can slide the cover off. If you're upgrading a 1000 SX, you must also remove a brace that obstructs the slots.

To extract the 8088, remove any expansion boards that are in the way and locate the 8088 next to the slots by the backplane. Ground yourself again and hook the chip puller around each end of the chip, *not* around the socket base. Place two fingers on top of the chip and gently rock the puller back and forth as you pull up. Once you've confirmed that the 8088's pins are straight, pull the daughterboard out of its antistatic bag and plug the chip into the provided horizontal socket, with the 8088's notch pointing to the right. To add a 6-MHz or 8-MHz 80287, locate the vertical socket on the 286 Express board and plug in the 80287, with the chip's notch pointing up.

Once the chips have fallen where they may, plug the daughterboard's ribbon cable into the 8088 socket on the motherboard. This is easier than plugging in a chip but must still be done with care. Finally, snap the daughterboard into the 286 Express and place the assembly in a free slot. (On a 1000 or 1000 A, using the leftmost slot minimizes cable contortions; on a 1000 SX, the rightmost slot is best.)

And that *should* be it. Reassemble the system (but leave the hood off), slip the boot disk into drive A:, and turn on the machine. If the computer doesn't boot up, turn it off and make sure the 286 Express is firmly seated in its slot; if an error message appears, chances are the 286 Express conflicts with another board in the system—which means you'll have to pull the 286 Express out and change some DIP switch settings.

Given all the effort and expense, you might ask how much speed the 286 Express buys. Plenty. Most applications will run 4 to 5 times faster, but informal tests show the board can speed up calculation-intensive tasks (such as recalculating a *1-2-3* worksheet) by as much as 90 times. Add an 80287 to the mix, and some tasks are completed 440 times faster. That's turboprocessing and then some.

Although the 286 Express is compatible with most software, the board's built-in cache conflicts with some compiled BASIC sort programs. Switching from the 8088 to the 80286 in the middle of a task can also cause programs such as *1-2-3* to make calculation errors. Otherwise, the 286 Express is a Tandy owner's dream. It makes the Tandy 1000 as responsive as an AT—at a fraction of the cost. —*Dennis Dykstra*

WHERE TO BUY

286 Express
Tandy Corp./Radio Shack
One Tandy Center
Fort Worth, TX 76102
817/390-3011
List price: $399.95, daughterboard for original Tandy 1000 $39.95 (part number AXX-7130)
Requirements: DOS 2.10 or later version; Tandy 1000, 1000 A, or 1000 SX computer
Warranty: two years parts and labor from PC Technologies
Extended warranty: none
Technical support: unlimited toll-free phone support from PC Technologies, M–F 8–5, or from any Radio Shack computer store
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For more information, see Products Featured in This Issue.

Quadruple Floppy Storage

In their quest for ever-greater floppy disk storage, PC users have turned to a number of solutions—most of them aimed at getting 5¼-inch 1.2MB floppy drives to work in PCs. Using PS/2-style 3½-inch drives wasn't an attractive option, because the PC's BIOS ROM limited such drives to 720K disks.

However, with a CompatiCard disk controller from MicroSolutions (see "Treble Storage, Part II," *The Upgrade Path, PCW,* September 1988) and Mitsubishi's $79 half-height 3½-inch MS 355B floppy drive, 1.44MB floppy storage can be yours. Now you can back up your PC's hard disk faster, use disks designed for the PS/2 without hassle, and of course easily swap data with laptop computers. The only limitations: The unit is treated as drive C:, and you can't boot the system from it.

Physically installing the Mitsubishi drive is simple work—and a good thing, too, since the supplied user manual doesn't discuss such details. Turn off the PC, unplug all external cables, remove the system cover, and ground yourself before touching the drive. Slide the drive into an empty bay (it comes with the appropriate mounting brackets and a half-height faceplate), and secure it to the right side of the chassis with two small screws.

(continues)

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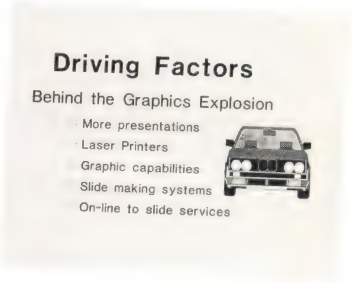

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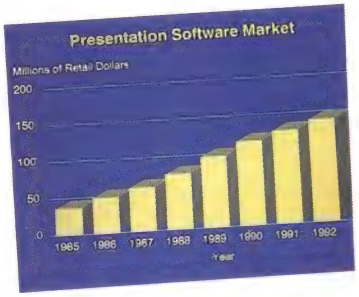

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Plug a free power supply connector into the back of the drive, and attach the unit's metal edge connector to the CompatiCard with the PC's floppy drive controller cable. Reassemble the system, and you're ready to go.

CompatiCard installation was detailed in last month's *Upgrade Path*. But keep a couple of details in mind: You must create or modify the boot disk's CONFIG.SYS file to reference MicroSolution's CCDRIVER.SYS device driver, and you must add several switches to the DEVICE = CCDRIVER.SYS statement. MicroSolutions classifies the Mitsubishi unit as a type 7 drive; if you attached the drive to the CompatiCard's P1 edge connector, CONFIG.SYS would thus hold the statement DEVICE = CCDRIVER.SYS /1,7. Once these files are in place, reboot the system, and the Mitsubishi is immediately available. To format 1.44MB and 720K disks, you must use MicroSolution's CCFORMAT.COM utility.

Of course, if you add the Mitsubishi drive to an AT, Compaq 386, or compatible computer, you won't need the CompatiCard at all because the floppy/hard disk controllers in these systems recognize high-capacity 3½-inch drives. Installation, however, is still complicated, and you must use the company's FORMAT35 utility to format disks.

Follow the steps described earlier to physically install the drive, but in this case, slip the plug for the B: drive at the end of the disk controller ribbon cable over the Mitsubishi's edge connector. Next, run the computer's setup program and declare that drive B: is a 3½-inch, high-capacity drive. (If your IBM-supplied diagnostic/setup utility lists only the '3.5 (720KB)' option, go ahead and pick it—the Mitsubishi drive should still successfully format 1.44MB disks.)

Once SETUP finishes, slip Mitsubishi's utility disk into drive A: and type **SETUP35**. As you answer the simple prompts, the program automatically copies the necessary drivers and utilities to the system's hard disk and creates or modifies the system's AUTOEXEC.BAT and CONFIG.SYS files. Reboot the system, and the drive is ready to roll.

One important caveat: The Mitsubishi drive will not properly format 1.44MB disks when installed in an IBM PC AT Model 339. According to Mitsubishi, this model's BIOS ROM doesn't support the 3½-inch high-density format, and there is no software workaround. So buyers beware.

Buyers should also be aware that not all 3½-inch disks are alike. Double-sided, double-density disks can be formatted to 720K; only high-density disks (which have an additional window opposite the write-protect window) should be used to hold 1.44MB of data. —*R. L.*

WHERE TO BUY

MS 355B
Peripherals Division
Mitsubishi Electronics America
991 Knox St.
Torrance, CA 90502
213/515-3993
List price: $79
Warranty: one year parts and labor
Extended warranty: none
Technical support: unlimited, toll-free number
Other support services: none
For more information, see Products Featured in This Issue.

Upgrade Update

If you've transformed your PC or AT into an 80386 powerhouse with a Hauppauge 386 Motherboard (see "The Ultimate Turbo Board," *The Upgrade Path, PCW*, November 1987), get out your checkbook. Hauppauge Computer Works has finally released 32-bit RAM boards for its XT and AT motherboards. The unpopulated 2MB board costs $295; an unpopulated daughterboard capable of holding another 2MB can be had for an additional $195. Both boards require 64K-by-4-bit (*not* 256K-by-1-bit) 100ns RAM chips. Contact Hauppauge Computers Works, 175 Commerce Dr., Hauppauge, NY 11788.

Dennis Dykstra is a contributing editor for PC World *and a professor at Northern Arizona University in Flagstaff.*

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●

POWER TIP NO. 15

See More Files in 1-2-3

1-2-3 worksheet files can build up quickly, but /File Retrieve will display only five file names at once. To display a full screen of files, use /File Retrieve <F3>. You can then select a file as you normally would.

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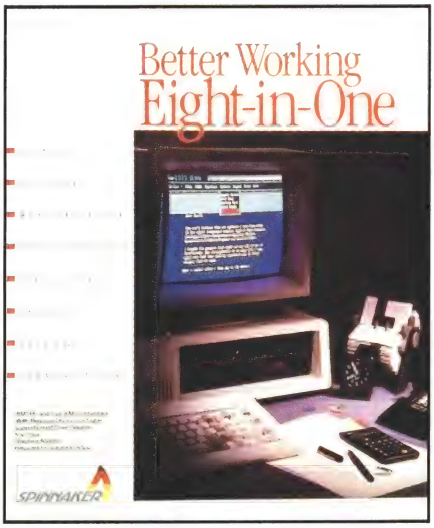

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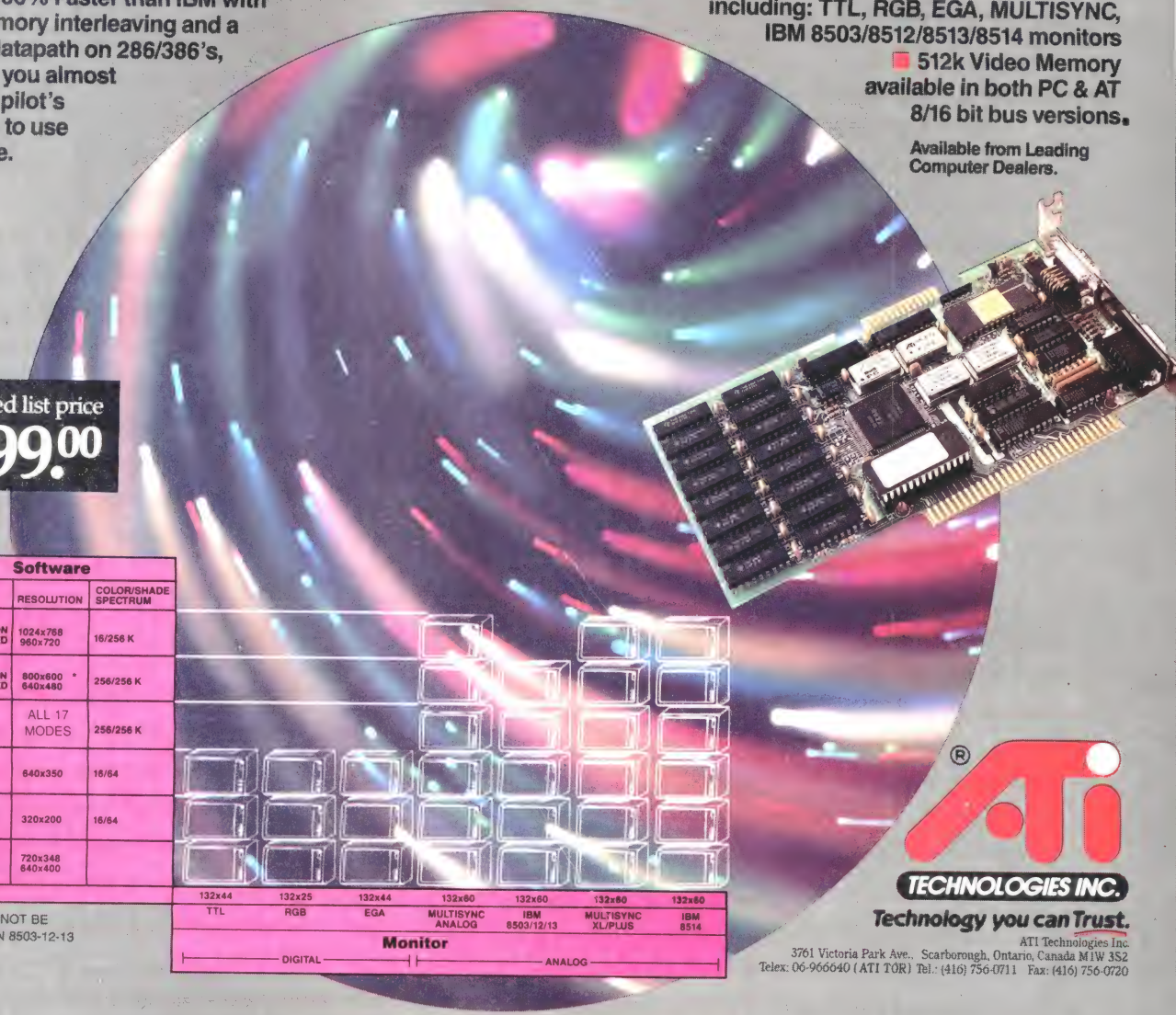

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CGA	320x200	16/64
MDA	720x348 640x400	

LINES OF TEXT	132x44	132x25	132x44	132x60	132x60	132x60	132x60
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Circle 302 on reader service card

THE HELP SCREEN

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Meet the Chargecard solution to 80286 memory expansion, switch from serial to parallel with a batch file, put a hard disk in the PS/2 Model 30, give old files a new date, mate a monochrome monitor with an EGA, and untangle a twisted definition.

Karl Koessel

ANTHONY RUSSO

Adding Memory to the PS/2 Model 50

Q. *What's the best, most economical way for me to augment the memory of my IBM PS/2 Model 50? Although I've read—and to some extent understood—a few articles regarding expanded or extended memory, I'm still unclear about what would suit my needs.*

I'd like to be able to run Microsoft Windows *or perhaps Quarterdeck Office Systems'* Desqview *multitasking environment, together with my word processor and data base. I don't intend to connect to a network or run OS/2.*

Ted van Ravenswaay
Tiburon, California

A. First, remember that some memory boards provide only extended memory, others only expanded memory, and still others can be configured either way. If you aren't going to run OS/2, you don't need extended memory, but having a board that can be set up as either expanded or extended memory is clearly the best way to keep all your options open. Note also that most older expanded memory boards support only the Lotus/Intel/Microsoft Expanded Memory Specification 3.2 (LIM 3.2). They are not capable of fully supporting LIM 4.0, which manages 32MB (versus LIM 3.2's 8MB) and makes it possible to run programs in expanded memory. (Version 3.2 boards can't run programs bigger than 64K in expanded memory.)

Entry-level Model 50s and Model 60s come with 1MB of memory, of which the first 640K is conventional (user) and the remaining 384K is extended. If you add the IBM PS/2 80286 Expanded Memory Adapter (or a third-party Micro Channel extended/expanded memory adapter) and a memory-management driver such as Quarterdeck's QEMM-50/60, you'll have expanded memory available for those programs that can use it. But for the best performance when using LIM 4.0–compatible expanded memory to multitask applications with *Desqview*, you have to disable the 1MB of motherboard RAM that comes installed in your Model 50.

Older versions of *Microsoft Windows* can use up to 640K but can't exploit extended memory. Even the new version, *Microsoft Windows/286*, lets you use only 50K of your PS/2's 384K of extended memory.

One solution to all the confusion about conventional, extended, and expanded memory is ALL Computer's Chargecard. Once it's installed in your 80286 system, you needn't worry about the difference between extended and expanded memory; nor must you disable the motherboard's conventional or extended memory.

(continues)

This deft memory-management module gives LIM 4.0 capability to as much as 16MB of the memory—conventional, extended, and expanded—installed in your system. This means you can get optimum use out of *Desqview* without losing your PS/2's 1MB of motherboard RAM. When running *Windows*, you have over 530K of free RAM for non-*Windows* applications without the slowdown of swapping *Windows* to disk.

The Chargecard also gives you up to 960K for DOS. (For those programs that write to video, an included utility does a one-time conversion before running them in a DOS space that extends beyond the beginning of the video buffer.) You can map slow ROMs into faster RAM; for example, you can make your EGA run faster.

The Chargecard is smaller than a business card. To install it, you pull out your Model 50's 80286, lay the Chargecard in the socket, and plug the 80286 into the Chargecard. Bundled with the Chargecard, you get a TSR manager that lets you tuck memory-resident programs into the free spaces above 640K that aren't occupied by the video buffer, the option ROMs, or the BIOS ROM. The TSR manager can also stow network drivers in that upper memory, freeing up RAM to let you run large programs on your network server. And if you do decide to install OS/2 (or some other protected-mode operating system, such as UNIX), you'll still be able to use all of your system's memory, without having to change a single switch.

WHERE TO BUY

ALL Chargecard
ALL Computers Inc.
21 St. Clair Ave. E #203
Toronto, Ontario
M4T 1L9 Canada
800/387-2744 for orders only, 416/960-0111
List price: $399
Requirements: pin-grid array 80286 or either an adapter for a leadless chip carrier or an adapter for a plastic, leaded chip carrier (adapters $100 each)
Warranty: five years
Extended warranty: none
Technical support: unlimited phone support, no toll-free number
Other support services: user BBS 416/960-5426, M–F 6 p.m.–8 a.m., 24 hours on weekends

IBM PS/2 80286 Expanded Memory Adapter
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Boca Raton, FL 33431
305/998-2000
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Requirements: IBM PS/2 Model 50 or 60 or compatible
Warranty: one year
Extended warranty: possibly free if your PS/2 has a service contract; ask your IBM sales representative
Technical support: ask your IBM sales representative
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QEMM-50/60
Quarterdeck Office Systems
150 Pico Blvd.
Santa Monica, CA 90405
213/392-9851
List price: $59.95
Requirements: IBM PS/2 Model 50 or 60 or a compatible
Technical support: unlimited phone support (no-wait priority service $30), operates M–F 9–5, no toll-free number
Other support services: fax (preferred), user BBS, CompuServe, BIX, MCI Mail

For more information, see Products Featured in This Issue.

Switch From COM1: to LPT1

Q. *I've written a pair of batch files for switching between the parallel and serial printers attached to the office PC. COM_PRT.BAT, which contains the command MODE LPT1:=COM1:, selects the serial printer, and works properly. However, if the parallel printer is off or disconnected, the command MODE LPT1:80,6 in PRL_PRT.BAT causes the batch file to hang, necessitating a reboot. Is there any way to get PRL_PRT.BAT to select the parallel printer even when that printer is turned off?*

Fred Sohiel
Washington, DC

A. Just remove the 80,6 from PRL_PRT.BAT's MODE command and everything should work just fine. Those numbers represent the desired number of columns (80) and lines per inch (6). When the printer is off or disconnected, it can't acknowledge the printer control codes that the MODE command sends to set those parameters. However, there's no need for your batch file to set them: Your parallel printer uses those values by default, and your applications set up the printer appropriately before printing. So just use the command MODE LPT1: to tell DOS that printer output should be directed to the parallel port. MODE LPT1:,,P does the same and also sets infinite retry on printer time-out.

A more elegant alternative would be for you to use one batch file instead of two. Using GETKEYD.COM from this month's

(continues)

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■ Free Form

Tornado is FREE-FORM. It works the way you think. To start a new window you just press N, and enter information. No file names. No extra keystrokes. To retrieve information you just press G (for Get), with any word or phrase—you'll watch Tornado zip through your windows like lightning linking and opening those requested. You can even flip through your windows with the arrow keys and watch them instantly pile up and lift away. These are just three of 18 easy but powerful features.

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```
echo off
if x==%1x goto nochoice
if S==%1 goto serial
if P==%1 goto parallel
if s==%1 goto serial
if p==%1 goto parallel
goto nochoice
:serial
mode lpt1:=com1:
goto end
:parallel
mode lpt1:,,p
goto end
:nochoice
cls
echo Please press either P or S to select
echo the parallel or the serial printer.
GETKEYD
if errorlevel 116 goto :nochoice
if errorlevel 115 goto serial
if errorlevel 113 goto :nochoice
if errorlevel 112 goto parallel
if errorlevel 84 goto :nochoice
if errorlevel 83 goto serial
if errorlevel 81 goto :nochoice
if errorlevel 80 goto parallel
goto nochoice
:end
```

LISTING 1: PRINTER.BAT uses GETKEYD.COM from this issue's Star-Dot-Star column to switch between parallel and serial printers.

Star-Dot-Star column, PRINTER.BAT in **LISTING 1** enables the user to enter PRINTER P to choose the parallel printer or PRINTER S to choose the serial printer. If the user enters just PRINTER, the batch file prompts the user to select *P* or *S*.

Model 30 Hard Disk

Q. *After several years of having others polish my handwritten reports into a presentable form in a fraction of the time it took me to handwrite them in the first place, I bought an IBM PS/2 Model 30 with two disk drives. At the time, it seemed sufficient, but now I find I need a hard disk.*

What kind should I get? Where do I get the best buy? Can I install it myself? And as long as I'm asking questions, what can be done to display Lotus 1-2-3 *graphs in color?*

Samuel J. Cullers
Sacramento, California

A. Let's take the last question first. The Model 30 (like the Model 25) uses an MCGA chip to produce video output. The Lotus drivers for *1-2-3* do not display graphs in color on PS/2s that use the MCGA but lack a video adapter. If you really must have color, you can add a VGA board from IBM or a third party.

Now for the hard disk: Although IBM sells a Model 30 that has an 80ms 20MB IBM hard disk, the company does not market a hard disk upgrade for that model. For the right price, you might be able to convince a dealer to swap one of your PS/2's floppy drives for a hard drive from one of his Model 30s. Because the Model 30's hard drive has an integrated controller, it doesn't require an expansion slot, but you do lose the second floppy. Alternatively, you can install Western Digital's PS25/20i, its hard disk upgrade kit for the Model 25. This 20MB drive also replaces the second floppy, and its controller uses one of the three expansion slots. The upgrade kit includes the WDPS30-BEZ hard drive faceplate (bezel), which replaces the floppy drive's faceplate.

If you don't want to give up that second floppy, there are other options. Any hard disk that works in an XT ought to work with your Model 30. External drives and hard disk drives mounted on an expansion card are readily available. Keep in mind that some hard disk cards are thicker than the width of one slot and may make it impossible to install an expansion card in the neighboring slot. With only three slots in the Model 30, you'll probably want to avoid such cards. Don't forget that the Model 30 has a relatively small power supply. If you have (or expect to have) other expansion cards, you'll want a hard disk that draws little power or packs its own supply.

WHERE TO BUY

PS25/20i
Western Digital
2445 McCabe Way
Irvine, Ca 92714
800/847-6181, 714/863-0102
List price: $525

(continues)

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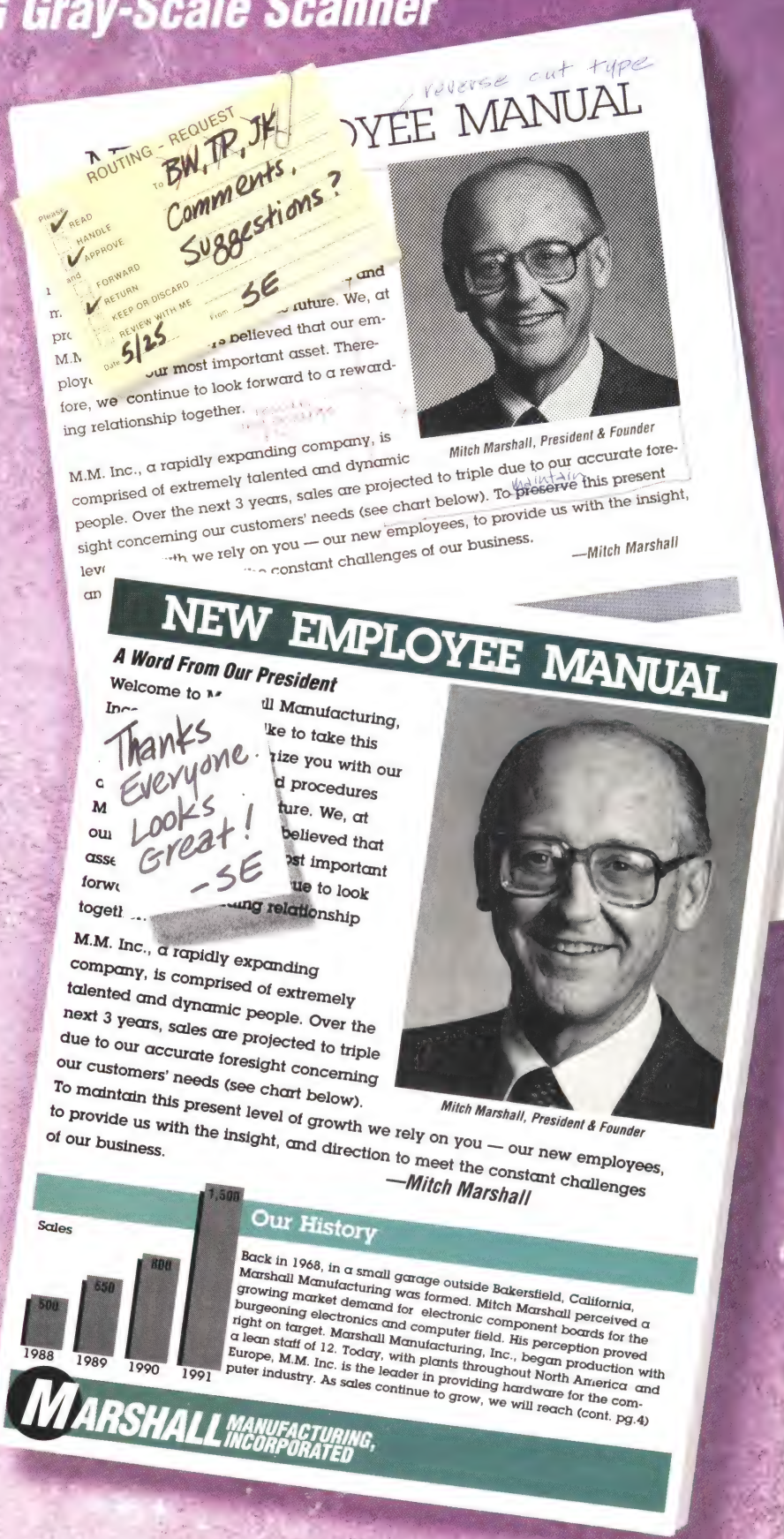

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For more information, see Products Featured in This Issue.

Old File, New Date

Q. *According to the DOS 2.10 manual, the command COPY* x:\path1\filename.ext+,, y:\path2 *not only copies* filename.ext *from the* \path1 *directory of drive* x: *to the* \path2 *directory of drive* y:, *it also sets the copied file's directory entry with the current date and time. You can also update the date and time without copying the file by making the* y:\path2 *(target drive and directory) parameters the same as the* x:\path1 *(source drive and directory) parameters.*

I've tried that command with three different versions of IBM DOS, with similar results. Each time, it changed the date and time, but it also truncated the file, resulting in an incorrect, unusable copy. Why doesn't this command work as documented?

R. Hygh
Alhambra, California

A. Look again at that section of the DOS 2.10 manual. It begins with the caution: "Remember to use the **/B** parameter whenever you use the plus (+) sign with non-ASCII files." An ASCII file may end with an ASCII 26, the ASCII end-of-file marker (also known as the EOF or a control Z). But a non-ASCII file (such as a program, an overlay, a driver, a graphics file, and so on) does not use an end-of-file marker. It may contain ASCII 26s, but they do not represent the end of the file.

When used without a plus sign, the COPY command by default assumes that there may be non-ASCII files to be copied and therefore doesn't check for an EOF. It copies a file according to the file size as listed in the directory. When used with a plus sign, the COPY command by default assumes you are updating or concatenating *ASCII* file(s) and copies up to the first ASCII 26.

Look back at your files that were accidentally altered. They *(continues)*

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are non-ASCII files. Because you used COPY with a plus sign, COPY assumed that the files were ASCII and copied them only up to the first occurrence of an ASCII 26. The /B parameter is used to override that default assumption so that COPY treats the file as non-ASCII. By using the /B parameter (COPY /B *x:\path\filename.ext* + ,, *x:\path*), you can amend the dates and times of files without cutting them short.

EGA-Driven Monochrome Monitors

Q. *There are several expensive EGA monochrome monitors, such as the Zenith ZVM-1240 and monochrome multiscan monitors. But are there any low-cost ones that can be used with a conventional EGA card?*

Do "enhanced" EGA cards deliver a decent image when displaying gray-scale substitutes for color on a monochrome monitor? Or do they produce images that suffer from flicker, partial display, blooming, or distorted aspect ratios when used with a TTL (digital) monochrome monitor?

Victor A.
Buffalo, New York

A. The EGA was designed to drive the original IBM Monochrome Display in two modes. Its text mode emulates the original Monochrome Display Adapter (MDA), delivering an 80-column, 25-row display with normal, inverse, blinking, bright, and invisible (black-on-black) characters in 9-by-14-pixel cells. The new EGA monochrome graphics mode generates 640-by-350-pixel graphics, with each pixel either on, off, blinking, or bright. This mode displays 80-column, 25-row text in 8-by-14-pixel cells. (These modes also support 80-column, 43-row text in 8-by-8-pixel cells.)

Many IBM Monochrome Display compatibles cost under $100. Chances are, if they produce an acceptably sharp display when driven by an MDA, they'll produce an equally clear display when used with an EGA. Of course, the quality of the EGA will also affect the image.

Many "enhanced" EGAs do suffer the problems you've de-

(continues)

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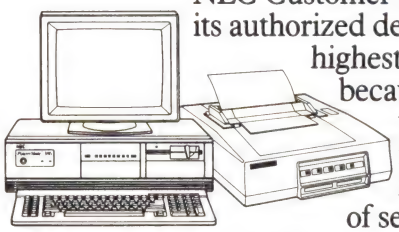

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scribed, even when used in monochrome mode with a monochrome monitor. It may be that, in the rush to release timely products, their designers paid too much attention to adding enhancements and not enough to supporting basic features. Remember, though, that the EGA is relatively old. Reviews of first-release EGAs may not apply to a company's current product. If possible, check out prospective purchases with all your software before you buy.

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POWER TIP NO. 16

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Smartcom III's Peruse buffer automatically stores on-line session data, which remains in memory even after you're off line. However, when you terminate a session—a separate step—the program clears the buffer without warning. To save the contents of the buffer, press <F6> to access the Peruse Buffer, then press <Ctrl>-<Page Up> to move the cursor to the top of the buffer. Now, block the contents by hitting <Alt>-S<Ctrl>-<Page Down><Alt>-S. Press <F3> to display the Peruse menu, and select either E to copy the block to the text editor or W to write it to disk.

Wes Nihei
Assistant Editor

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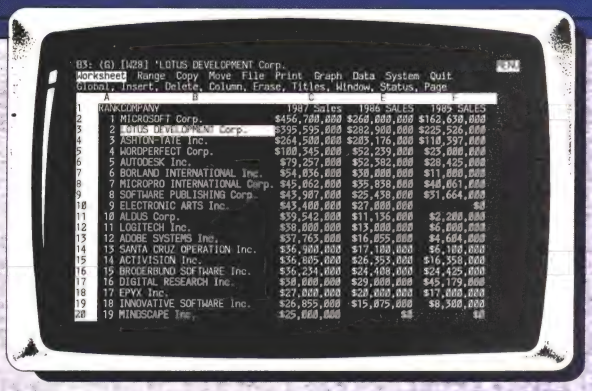
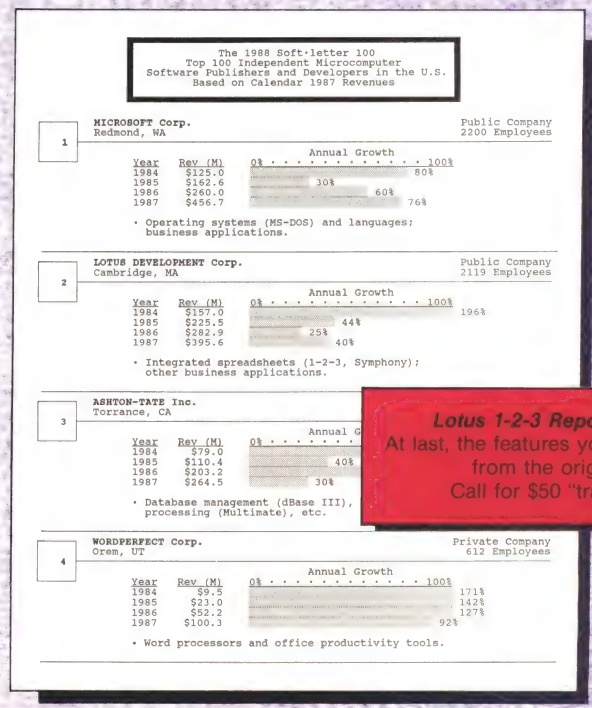


A Lotus database is a range or an entire worksheet having field names in the first row and records of data in rows below.



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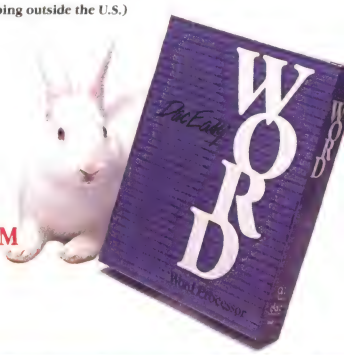

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STAR-DOT-STAR

.

A global exchange of personal computer discoveries

Cut waste with WordStar, teach your batch files to recognize keys, increase your AutoCAD comfort, simplify BASIC PRINTing, and get started with OS/2 software development.

Edited by Tom Swan

ANTHONY RUSSO

Waste Not, Want Not

Entering the same data more than once wastes computer and human resources. To reduce waste in our office, I've developed a collection of *WordStar* macros and templates that allows me to enter a name and address a single time for all my letters, labels, and envelopes.

I keep each name-and-address record on its own line in a nondocument ASCII-delimited file named ADDRESS.PAD [see sample in **FIGURE 1**]. To start a new letter, I first run INSADD.BAT [**LISTING 1**] from the DOS command line (or after selecting Run from *WordStar*'s opening menu) by typing INSADD plus one or two names to identify a record. INSADD.BAT searches ADDRESS.PAD for the record containing those key names and copies that record to a temporary file, PADD.TXT. For example, typing *INSADD Star* locates this column's address. (If I need to modify the address before using it, I can edit PADD.TXT at this point.)

Once PADD.TXT has the record, I can use my four *WordStar* macros [**FIGURE 2**] and three templates [LTRFM, ENVELOPE, and LABEL in **FIGURES 3** through **5**]. Each macro uses the appropriate template to insert the name and address in the right place. From the opening menu, I press <Esc>-W to write the letter, creating the file LTR from the LTRFM template. Pressing <F10> saves the letter to disk and, again from the opening menu, <Esc>-P prints the letter, <Esc>-E prints an envelope, and <Esc>-L prints a label.

Paul Tempke
Doylestown, Pennsylvania

Editor's note: Create ADDRESS.PAD with WordStar*'s nondocument option, or use* dBASE*'s Delimited option with the COPY command to transfer names and addresses from a data base. Bring up* WordStar*'s opening menu and enter the keystrokes shown in* **FIGURE 2**. *Edit the templates' dot commands to fit them to your letterhead and envelopes.*

All Keyed Up

Popular batch-file utilities that prompt for yes/no answers and return ERRORLEVEL values of 0 for no and 1 for yes can be too restrictive for many users. To handle a variety of single-key responses, I developed two simple programs. GETKEY.COM returns the ASCII code of a key press through ERRORLEVEL. GETKEYD.COM does the same and also displays characters as you type.

From the DOS prompt, create both programs with DEBUG by entering the bold text shown in

(continues)

```
Star-Dot-Star,PC World,501 Second St.,"San Francisco, CA 94107"
Customer Sales Service,MicroPro,P.O. Box 7079,"San Rafael, CA 94901-7079"
Ronald Reagan,The White House,1600 Pennsylvania Ave.,"Washington, DC 20500"
Pete Wilson,United States Senate,,"Washington, DC 20510"
Barbara Boxer,House of Representatives,,"Washington, DC 20505"
```

FIGURE 1: ADDRESS.PAD, a sample name-and-address file for use with LISTING 1

```
echo off
cls
if x==%1x goto end
if x==%2x goto next
find "%1" ADDRESS.PAD | find "%2" >PADD.TXT
echo off
cls
goto jump
:next
find "%1" ADDRESS.PAD >PADD.TXT
echo off
cls
:jump
echo Contents of File PADD.TXT
echo.
type PADD.TXT
:end
```

LISTING 1: INSADD.BAT searches ADDRESS.PAD (FIGURE 1) for one or two key names.

FIGURE 6. TESTGK.BAT [**LISTING 2**] demonstrates how to use the programs.

Matthew K. Behrens
Jenison, Michigan

Editor's note: As **LISTING 2** *shows, two tests are required to check for a specific key press. Because IF ERRORLEVEL is true for values equal to or greater than the desired value, you must first check for the ASCII code of the* next *highest character before checking for the ASCII code of any valid key press. In doing this you ensure, for example, that a* Z *does not pass for a* Y. *Also, when testing for multiple responses, always test higher ASCII values first.*

DEVELOPER'S TOOLBOX

Microsoft Leads With OS/2 Languages

Chalk one up for Microsoft—or make that six. With the introduction of the *OS/2 Programmer's Toolkit* plus upgrades for the company's five main languages—C, Pascal, Macro Assembler, BASIC, and FORTRAN—Microsoft has gotten off to a head start in the race to develop OS/2 software tools. (At press time, COBOL was added to the pack.)

Never mind that there's no competition or that few people use OS/2. If you want to dabble in OS/2 software development, Microsoft has the only game in town.

(continues)

```
<Esc>?
E
print>ENVELOPE<Enter>
MENVELOPE
<Ctrl>-P<Ctrl>-M<Ctrl>-P<Ctrl>-M
yn
<Ctrl>-P<Ctrl>-M
<Ctrl>-P<Esc>
<Enter>
L
print>LABEL<Enter>
MLABEL
<Ctrl>-P<Ctrl>-M<Ctrl>-P<Ctrl>-M
yn
<Ctrl>-P<Ctrl>-M
<Ctrl>-P<Esc>
<Enter>
P
print>LETTER<Enter>
MLTR
<Ctrl>-P<Ctrl>-M<Ctrl>-P<Ctrl>-M
yn
<Ctrl>-P<Ctrl>-M
<Ctrl>-P<Esc>
<Enter>
W
write>LETTER<Enter>
OLTRFM
<Ctrl>-P<Ctrl>-M
LTR
<Ctrl>-P<Ctrl>-M
y
<Ctrl>-P<Ctrl>-M
dLTR
<Ctrl>-P<Ctrl>-M
<Ctrl>-P<Ctrl>-QC
<Enter>
<Enter>
y
```

FIGURE 2: These WordStar macros print letters, envelopes, and labels using the mail merge templates in FIGURES 3 through 5.

```
.df PADD.TXT
.rv name,comp,address,city/st
.mt0
.pl56
                                &@&

& Name/o       &
& Comp/o       &
& Address/o    &
& City/St      &
.mt8
.hm4
.pl66
.h1          & Name & -- page #
.op
```

FIGURE 3: LTRFM template

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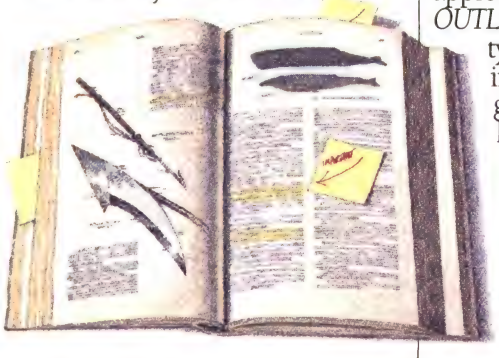

3. Thar she blows! Or maybe over thar...

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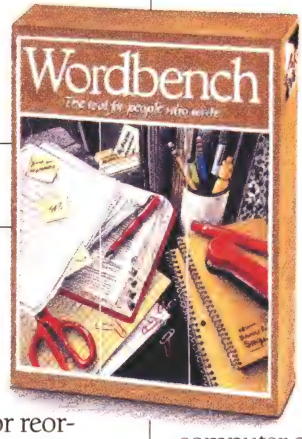

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PC WORLD


```
.df PADD.TXT
.rv name,comp,address,city/st
.mt0
.po5
.lh16
& Name      &
& Comp      &
& Address   &
& City/St   &
```

FIGURE 4: ENVELOPE template

```
.df PADD.TXT
.rv name,comp,address,city/st
.mt0
.po35
.lh16
.pl20
.mb0
& Name      &
& Comp      &
& Address   &
& City/St   &
```

FIGURE 5: LABEL template

Even if you're not as eager as I am to get up to speed in OS/2 programming, the new Microsoft packages still have plenty to offer. Included with each language is the CodeView debugger with versions for both OS/2 and DOS. Also on disk are DOS and OS/2 versions of the Microsoft Editor, which is capable of emulating *WordStar*'s nondocument mode, as well as *Brief* and *Epsilon*. Apparently, this is the editor that Microsoft programmers use in-house. And, of course, all languages fully support DOS and OS/2 and can bind programs to run under either operating system or both.

This may come as a surprise to those who assume that OS/2 programs will not run under DOS. Of course, programs that call OS/2 functions, including those of the Presentation Manager, require OS/2. But by restricting function calls to the Family API, a DOS-compatible subset of the full OS/2 library, you can compile and bind a program to a single file that runs as a task under OS/2 or as a single application under DOS. The language manuals explain in detail how to accomplish this magic.

```
DEBUG <Enter>
-NGETKEY.COM <Enter>
-A <Enter>
xxxx:0100 MOV AL,00 <Enter>
xxxx:0102 INT 16 <Enter>
xxxx:0104 MOV AH,4C <Enter>
xxxx:0106 INT 21 <Enter>
xxxx:0108 <Enter>
-RCX <Enter>
CX 0000
:8 <Enter>
-W <Enter>
Writing 0008 bytes
-NGETKEYD.COM <Enter>
-A104 <Enter>
xxxx:0104 PUSH AX <Enter>
xxxx:0105 MOV AH,0E <Enter>
xxxx:0107 INT 10 <Enter>
xxxx:0109 POP AX <Enter>
xxxx:010A MOV AH,4C <Enter>
xxxx:010C INT 21 <Enter>
xxxx:010E <Enter>
-RCX <Enter>
CX 0008
:E <Enter>
-W <Enter>
Writing 000E bytes
-Q <Enter>
```

FIGURE 6: Enter the bold text to create GETKEY.COM and GETKEYD.COM.

For those who want to write pure OS/2 applications, the *OS/2 Programmer's Toolkit* provides the necessary libraries and documentation. On disk are several sample programs, including games, a terminal emulator, and a text editor. Examining the C source code of these programs is a great way to learn OS/2 tricks and techniques.

(continues)

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Of the five language upgrades, I'm most impressed with Microsoft BASIC and C, both of which come with their quick counterparts, QuickBASIC and QuickC, at no extra charge.

Not all is sweet with the Microsoft Pascal compiler, though. While much improved over previous releases, Microsoft Pascal still produces bloated .EXE files and slow code. I expected better. I won't soon be parting with my treasured Turbo Pascal, but until Borland and other language companies release their own OS/2 tools, I'll be using Microsoft Pascal to learn OS/2 concepts.

Want to get started in OS/2 development? Get any 80286 machine or, better by far, an 80386, plus an OS/2 version that runs on that system, the Macro Assembler, and the *Programmer's Toolkit*. For a high-level language, you can use BASIC, FORTRAN, or Pascal, but for serious OS/2 work, C is best.

For editing, I'll stay with *Brief*— although the new Microsoft Editor is more than adequate for most programming tasks. (An OS/2 version of *Brief* is in the works.) I'll probably use Turbo Pascal and DOS for creating prototypes, convert to Microsoft Pascal for OS/2 testing, and then rewrite in Microsoft C for the finished product.

Six months from now, I may have a different opinion. After all, this is only the first lap for OS/2 software developers, and we can expect strong competition from others now preparing OS/2 languages and tool kits. Until these products appear, however, Microsoft has this race in the bag. —*Tom Swan*

```
echo off
:ta1
echo Are you male or female? (M/F)
rem GETKEYD displays input
getkeyd
echo.
if errorlevel 110 goto err
if errorlevel 109 goto male
if errorlevel 103 goto err
if errorlevel 102 goto female
if errorlevel 78 goto err
if errorlevel 77 goto male
if errorlevel 71 goto err
if errorlevel 70 goto female
:err
echo Invalid response.
goto ta1
:female
echo You are a female.
goto ta2
:male
echo You are a male.
:ta2
echo Correct? (Y/N)
rem GETKEY does not display input.
getkey
if errorlevel 122 goto ta2
if errorlevel 121 goto end
if errorlevel 111 goto ta2
if errorlevel 110 goto uhoh
if errorlevel 90 goto ta2
if errorlevel 89 goto end
if errorlevel 79 goto ta2
:uhoh
echo Uh-oh. Either you answered incorrectly or
echo something's wrong with the GETKEY or GETKEYD files.
goto eof
:end
echo Files GETKEY and GETKEYD are probably okay.
:eof
```

LISTING 2: Batch file TESTGK.BAT tests the GETKEY and GETKEYD utilities (see FIGURE 6).

WHERE TO BUY

OS/2 Programmer's Toolkit
C Compiler 5.1
BASIC Compiler 6.0
FORTRAN Compiler 4.1
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List price: Toolkit $350, C $450, BASIC $295, FORTRAN $450, Assembler $150, Pascal $300
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Softstrips

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Circle 108 on reader service card

Note Card Tricks

Inspired by the humble 3-by-5 card, personal information managers have come a long way. Leave it to Lotus to raise the standard.

Robert M. Carr

FRED STIMSON

A bit of childhood's chaos vanishes when grade school students meet index cards. My own first encounter with this marvelously flexible information management tool involved recording types of clouds on a dozen 3-by-5 cards. My head is no longer in the stratosphere, but note cards are still on my mind. Astute observers of software trends, take note: The index card is making a comeback, electronically.

For years PC software was an exclusive club, dominated by word processors, spreadsheets, data managers, and their ilk. Upstart categories, like desktop publishing and integrated software, struggled for acceptance like plebes at a hazing.

This year another category is striving to gain admission to the club. Members go by various names, including *free-format text data bases, flexible filers, ad hoc information managers,* or, as Lotus terms the whole genre, *personal information managers* (PIMs). Despite having the lowly note card as its only operative metaphor, this class may well make the grade. Because PIMs do so many things so well, they may become the first enduring new category since graphics.

Many programs that come under the PIM rubric have been around for a while, but it took Lotus and its new *Agenda* to pull together a grab bag of seemingly disparate packages in a coherent way. Still, tough questions persist. Which implementations best serve evolving demand? How can you evaluate a genre that lacks both an extensive track record and established decision criteria?

Head of the Class

Some genres of software exist because they automate previously manual tasks; others implement operations that have little precedent in the nonsilicon world. PIMs don't fit neatly into either category but instead tend to incorporate some of each. Consequently, they must work extra hard to find a legitimate niche.

The legitimacy of a new category isn't an academic concern. Innovation invites company; once a genre proves it's here to stay, other developers flock to it, and ideas cross-pollinate. The result? Better software and, for users, greater productivity.

Like graphics programs, PIMs are a diverse lot. Currently they encompass four species of program: free-format text data bases, outliners, Lotus's *Agenda*, and task-specific organizers.

Each strain is distinguished by its data structuring tech-

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nique—that is, its means of storing, loading, displaying, and manipulating data. Indeed, here structure (or its absence) is everything. PIMs all merge impressive data management–like searching capabilities with flexible filtering and reporting, but each type approaches data handling in a different way.

PIMs are to data managers what knives are to circular saws: Both cut, but you'd hardly apply them to identical jobs. PIMs perform fine, detailed work—unlike data managers, which plow through great masses of material. A data manager requires that records be uniform in format and vernacular. Such software exploits that uniformity with algorithms that efficiently manipulate data en masse and enable powerful reporting. Data volumes must be stored on disk and indexed with pointers to precise locations—hastening what would otherwise be sluggish disk searches.

Although performance is critical for PIMs, they don't place as great a premium on speed and data capacity, chiefly because personal information files tend to be relatively small. PIMs also can support indexes for large amounts of data, but the data's relative lack of structure makes it less suitable for indexing. With no need to drag indexes along, the PIM may be that rarest of applications: It doesn't sell additional hardware.

Knowing No Boundaries

Seaside Software's *askSam* is perhaps the best example of a free-format text data base. *Free-format* is no exaggeration; *askSam* imposes only the barest structure on your information. Text is grouped into screen-size chunks called cards. The size of fields on a card can vary significantly; further, cards can accommodate unstructured text at any point in the program.

askSam's power arises from its ability to infer structure when you specify a search, thanks to a supercharged word processing–like search command. Any and all text on the card may be treated as a searchable field by the program's muscular search command language. *askSam* then doggedly plows through raw text, searching exhaustively yet quickly for the string combination you specify.

askSam's flexible search logic gives the program its admirable speed by using a simple, tightly coded matching algorithm. The algorithm scans the contents of each card in search of just one target string; more complex search specifications come into play only when a partial match is made. *askSam*'s on-the-fly search scheme receives a boost from an 8088 "scan" instruction (replicated in 286 and 386 CPUs) that searches memory for a single character.

However, *askSam*, which is disk-based, can take this technology only so far; for large data bases, the program may compensate with disk caching. Also, *askSam* and similar free-format text data bases lack error checking on field entry, a second limitation that renders them inappropriate for larger data bases.

For All Indents and Purposes

Although automated outlining has been a mainstay of better word processors for some time, only recently has it entered the PIM realm—and a period of ferment.

Symantec's venerable *ThinkTank* enables you to organize text headings into an outline that can be manipulated via a series of restructuring commands. Now the company's new *GrandView* takes a few giant steps further, blending traditional outlining with word processing and the ability to attach multiple fields to each outline heading.

Outliners are ideal for *decomposition*, which is basic to project planning and document outlining. Decomposition involves breaking a heading into its subheadings and then layering subheadings with increasing precision. Because you can group assorted items under various headings and collapse headings to hide their contents, outliners are also a handy way to organize essentially random data. The outline's hierarchical nature lets you tinker with groups of headings (and their subordinates) at one time.

GrandView's search and sort commands operate on fields attached to outline headings. The program searches and sorts on outline fields in a manner similar to a nonindexed data manager; *GrandView* steps through each relevant heading. Because headings are structured into a series of fields, the program is able to examine relevant fields quickly, thereby avoiding an exhaustive search. The drawback: You must define fields, sacrificing some flexibility.

Setting an Agenda

Architecturally speaking, Lotus Development's *Agenda* is in a class by itself.

With *Agenda*, you enter information in free-format text units called *items*. Items can be as little as a few lines long, but they can piggyback several pages of

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notes. You can organize items by assigning them to one or more categories of your design.

Superficially, *Agenda* resembles an outliner—categories are organized in outline form. But the program's real power lies in its ability to separate the outline from the items. The items reside in their own data base, which permits access from different *views*. Views are essentially interactive reports on the item data base. One view might order items by priority, another by project.

Like hypertext, *Agenda* enables users to determine associations after the fact, almost automatically. The program relies on artificial intelligence–like inference techniques and a natural-language facility to arrange items appropriately. Entering text items in a view automatically files them under all pertinent categories. The same process applies when an item is edited, regardless of the view in which it was entered.

Agenda's hierarchy of categories thus imposes a solid framework. This structure enables the program to store data on disk but at the same time permits efficient access through proprietary indexing technology.

Task Masters

Although these three breeds of personal information manager are capable of handling just about any data you toss their way, a fourth class comes preconfigured to manage specific kinds of information.

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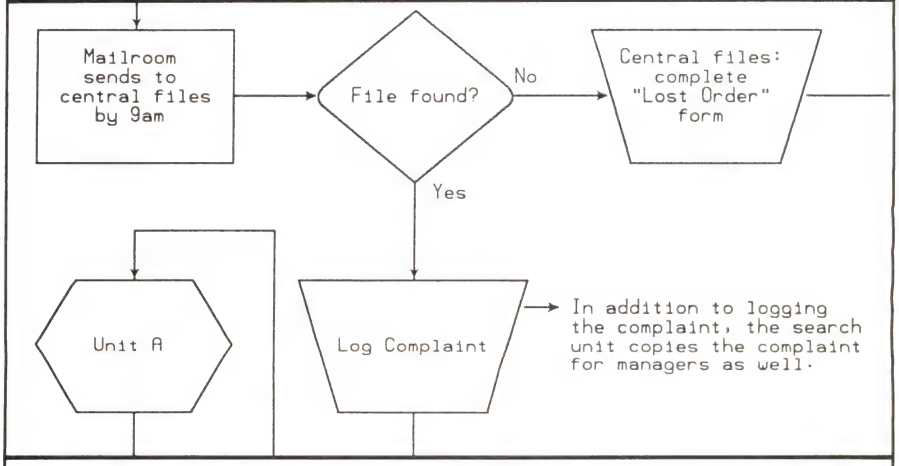

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programs are highly integrated, designed to use text, flat-file data managers, calendars, and outlining as inventory in a single grand data store, while windows display links among program components.

Act, for instance, maintains a data base of contact lists, a calendar, a datebook, address and phone lists, expense records, and notes. You can query that data base using an on-screen form that includes more than 30 task-oriented fields.

Because task-specific products tend to reflect a narrow worldview, they're really the templates of the PIM realm. And, as task-specific products, they provide the classic trade-off between convenience and power: They're generally easy to learn and use, but they don't provide much headroom.

Helping With Homework

Personal information managers aren't yet a stable or well-defined software category, so it's difficult to predict innovations and product wrinkles. If history is any guide, however, PIMs will evolve significantly before they settle down.

The relationship between spreadsheets and task-specific templates demonstrates that when a genre is mature, the market prefers specialized solutions only if they're implemented atop generic tools. Although no PIM includes a macro language or adequate support for application development, the next generation of PIMs (perhaps written for OS/2) may oblige on both counts. If either development occurs, the appeal of such task-specific tools as *Act* and *Info-XL* may diminish.

Free-format text data bases

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are superb for extensive research work. You can entrust just about any kind of information to them, as long as you don't mind tough but powerful command languages. But because they display only single, sequential records on screen, such programs require that you work from printouts.

Although *Agenda* provides new and more potent capabilities, *GrandView*'s outline form is more familiar. Both PIMs offer a significant advantage over free-format text data bases, which resist on-line analysis and viewing and whose close adherence to the 3-by-5–card metaphor can be limiting. Even with *GrandView*'s added oomph, however, outliners are confined to relatively simple list keeping and traditional document planning and brainstorming.

At the moment, *Agenda* has emerged as the PIM to beat. Its unique item-category data base structure is particularly useful if you need to see the big picture. Unlike *GrandView*, *Agenda* fluidly relates dozens of separate lists and does so without needing exact field structures. And because *Agenda* divines an order for the text from the content itself, you can "pour" information into the program and let it organize the data for you.

With *Agenda*, and to some degree with all PIMs, you're better able to manage dynamic situations. Although the PC hasn't moved the world even a notch closer to the paperless office, personal information managers may well revive that elusive and laudable goal. ●

Robert M. Carr is the creator of Framework II *and a cofounder of Go Corporation, a software startup.*

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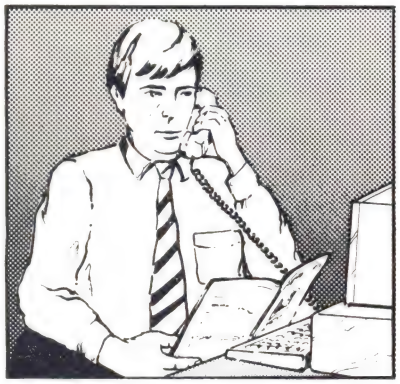

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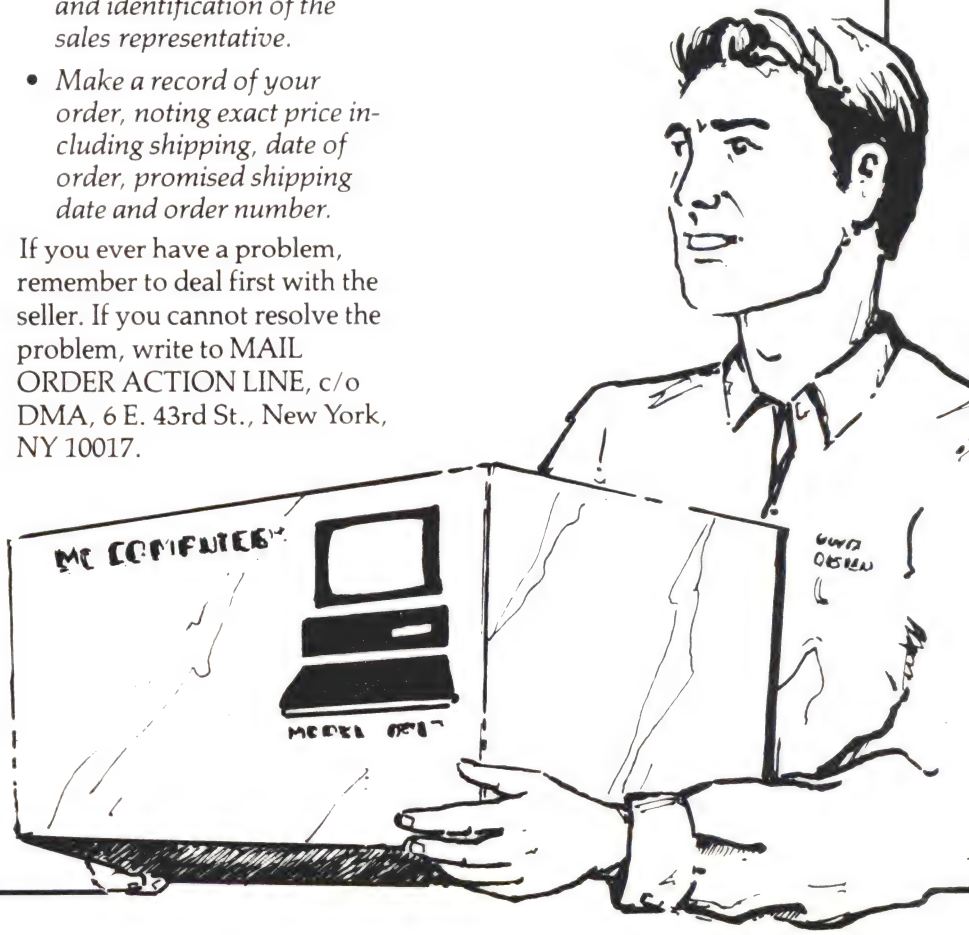

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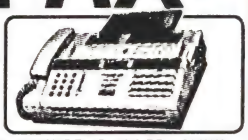

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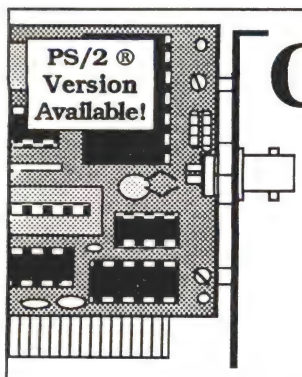

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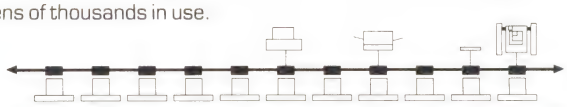

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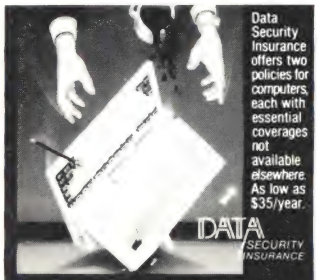

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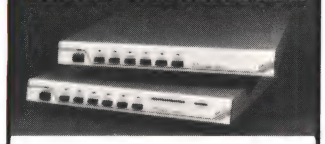

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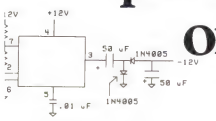

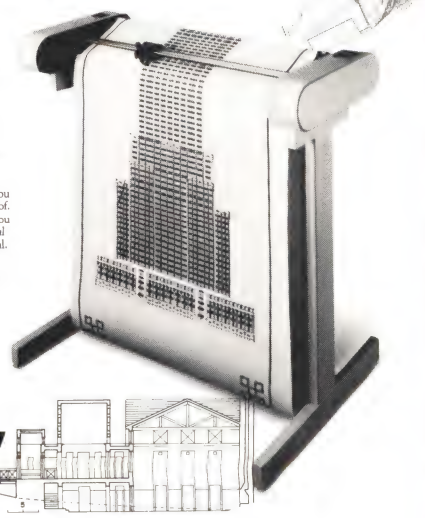

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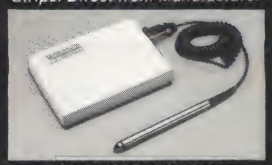

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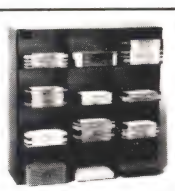

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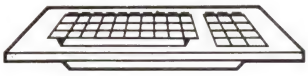

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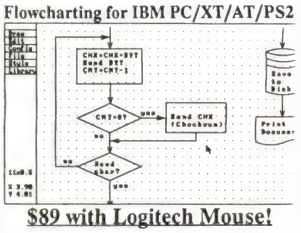

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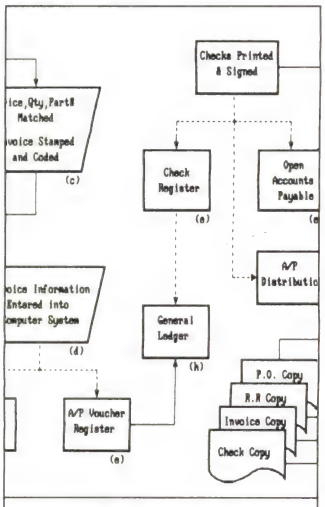

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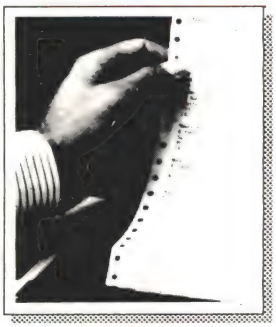

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Orchid VGA

$229

List $445

This brand new VGA board from Orchid is a winner. It provides VGA, EGA, CGA and MCGA register level compatibility and has hardware capabilities for zooming, horizontal panning and vertical scrolling. It has three 132 column modes and has a RAM loadable character generator. You can save on all the popular Orchid products when you order from us.

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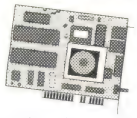
USRobotics Modems



These modems offer modern technology at affordable prices. These models feature AT command set and S-register level compatibility. They have line output jacks and speaker volume controls. Internal or external, 1200 or 2400 baud, we have USRobotics quality for less!

Model	1200	2400
Internal	$69	$129
External	$89	$149

HARDWARE

PRINTERS

	LIST	FAST
Citizen		
120D	229	145
180D	259	165
MSP40-55		Call
Tribute 124	699	449
Tribute 224	949	599
Diconix		
150P	499	299
Epson		Call
Fujitsu		
DL3400	995	549
NEC		
P2200	569	349
P5200	799	509
P5300	1049	669
P5XL	1295	Call
LC890	4799	Call
Okidata		
182 Plus	319	219
292	539	349
320	499	329
390	699	469
393	1399	915
Panasonic		
KXP1080i-2	299	159
KXP1091i-2	329	195
KXP1592	699	389
KXP1595	749	419
KXP1524	949	519
Star		
NX1000	289	179
NX2400	499	339
NB2410	699	449
Toshiba		
P321SL	749	467
P341SL	999	649
P351SX	1499	929

BOARDS

	LIST	FAST
AST		
Hot Shot 286	645	339
Six Pak Plus	210	119
Others		Call
ATI		
VIP VGA	449	259
Everex		
1200B Int Modem	149	73
2400B Int Modem	249	149
Genoa		
Super EGA Hi-Res+	399	175
Super VGA #5100	445	239
VGA Hi-Res #5200	645	359
Hercules		
Graphic Card +	299	169
Intel		
8087-2	250	149
80287-8	410	249
80287-10	480	287
Above Board 286	645	359
Orchid		
VGA	399	229
Designer VGA	545	299
Tiny Turbo 286	445	269
Twin Turbo 12mhz	645	379
Paradise		
Basic EGA	199	Call
Autoswitch 480	349	Call
VGA Plus	399	259
VGA Professional	599	369
5 Pack 0K	129	59
Practical Peripherals		
1200B Int Modem	99	65
2400B Int Modem	199	149

	LIST	FAST
Prometheus		
Promodem 1200B	119	73
Promodem 2400B	199	129
Promodem 2400G	249	159
The Complete PC		
Answering Machine	349	219
Complete FAX	499	319
Hand Scanner	249	159
USRobotics		
See prices listed above		
Video 7		
Fast Write VGA	549	329
Vega Deluxe	379	179
Vega VGA	499	259
V-RAM VGA	799	489

LAPTOPS

	LIST	FAST
Mitsubishi		
MP-286L 20mb	3995	2495
NEC		
Multispeed EL II	2295	1449
Multispeed HD	3695	2249
Sharp		Call
Samsung		Call
Toshiba		
T1000	1249	769
T1200F	2399	1599
T1200H	3499	2299
T3100/20	4699	2995
T3200	5799	3695
T5100	7499	Call
Zenith		
SuperSport Dual	2399	1599
SuperSport 20mb	3599	2399
SuperSport 286	4999	Call

MONITORS

	LIST	FAST
Amdek		
1280	999	669
210A	129	89
310A *Limited Offer!*	230	75
722 EGA	799	439
Magnavox		Call
Mistubishi		
1409 RGB	399	259
1410 EGA	599	399
Diamond Scan 1381	799	489
NEC		
Multisync II	899	Call
Multisync GS	279	189
Princeton		
Max15	389	189
Utltrasync	849	Call
Sony		
1302 Multiscan	995	659
1303 Multiscan	825	499
Thomson		Call
Zenith 1490	999	599

DISK DRIVES

	LIST	FAST
Fujitsu		
360K Floppy	119	77
720K 3.5" Floppy	149	87
1.2MB 5.25" Floppy	149	87
Miniscribe		
40MB AT #3650	499	319
Seagate		
20MB XT Kit #225	599	267
30MB XT Kit #238	699	287
30MB AT #138	599	299
40MB AT #251	899	349
80MB AT #4096	1199	599

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SOFTWARE

Database

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Clipper	699	359
DataEase	600	359
dBase III+	699	359
dBXL Diamond	199	105
Foxbase Plus	395	185
Paradox	725	399
Quartz	795	449
RapidFile	295	179
Rbase for DOS	700	419
Reflex	150	84
Q & A	349	179

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PFS:First Publisher	99	55
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Deluxe Paint II	105	67
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Freelance Plus	495	Call
GEM Draw Plus	299	165
Generic CADD	99	50
Harvard Graphics	495	Call
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WordPerfect Exec.	249	117

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Logitech HiRes	150	83
Microsoft Serial/Bus	150	95
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Datasheild 100	99	57

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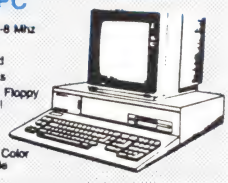

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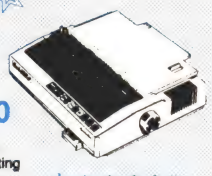

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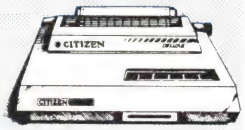

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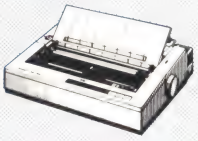

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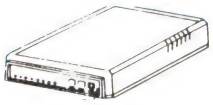

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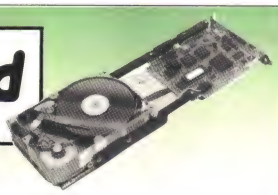

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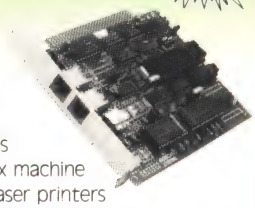

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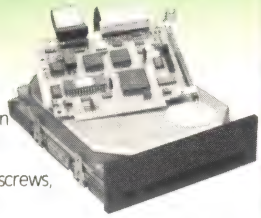

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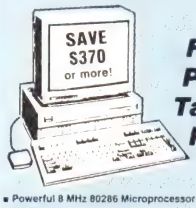

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386 Deskpro/20 300 Mb	$8900
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Multimate Advantage 2	$259
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393	$945

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RP MonoGraphics	$69
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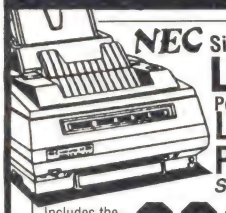

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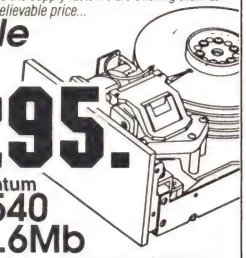

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XT Multi I/O w/floppy contr ..... 69.
XT dual Floppy controller ..... 29.
XT Serial I/O card ..... 29.
XT/AT Parallel I/O card ..... 29.
AT Serial I/O card ..... 39.
XT/AT Game adapter port ..... 29.
XT/AT EPROM programmer ..... 149.
AT 3.5Mb w/Multi I/O, 0K ..... 199.
AT SuperMULTI I/Ow/floppy ..... 119.
PS/2 Multi I/O ..... 99.
PS/2 Floppy controller 1.4Mb ..... 89.
HP Laserjet 1Mb Ram card ..... 349.

MOTHERBOARDS
XT Turbo w/BIOS, 8MHz ..... 89.
XT Turbo w/BIOS, 10MHz ..... 99.
AT 286 w/BIOS, 10 MHz ..... 289.
AT Baby w/BIOS, 12MHz ..... 299.
AT 386 w/BIOS, 16MHz ..... 1499.

HARDWARE

AST Research
Xformer/286, 512K, 10MHz ..... 699.
Advantage 2/386,mod.80,1Mb .. 725.
Advantage 2/286,PS/2,0K ..... 349.
Advantage Premium 286,512K ... 389.
Rampage 2/286,PS/2,512K ..... 499.
Rampage 286, 512K ..... 489.
AST Sixpakplus, 0K ..... 119.

ATI Technologies
EGA Wonder 800 ..... 199.
VGA/VIP ..... 319.
2400etc int. Modem w/MNP-5 ... 188.

GENOA
Super EGA ..... 199.
Super VGA ..... 299.

GULFSTREAM
EZ-FAX Board w/software ..... 1188.

HERCULES
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Graphics Card Plus ..... 174.

INTEL
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Inboard 386/AT to 386 ..... 1059.
Above Board 2,PS/2 mod50/60 ... 299.
Above Board 286,AT,512K ..... 329.
Above Board PS/286,model 30 ... 349.
8087 (5MHz) ..... 102.
8087-1 (10MHz) PS/2 ..... 205.
8087-2 (8MHz) ..... 158.
80287-6 (6MHz) ..... 185.
80287-8 (8MHz) ..... 255.
80287-10 (10MHz) ..... 309.
80387-16 (16MHz) ..... 549.
80387-20 (20MHz) ..... 799.

ORCHID Technology
Tiny Turbo 286 *-REDUCED!* ..... 289.
Designer VGA Board ..... 299.
RAMQUEST 50/PS/2, 2Mb ..... 699.

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VGA Plus ..... 299.

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Quad386XT ..... 747.
Prosync(640x480,752x410) ..... 269.
Microfazer II buffer w/64K ..... 239.
Quadsprint XT accellerator ..... 98.
Liberty EMS XT card, 0K ..... 98.
Silver Quadboard, Sixpak comp. ... 98.

VIDEO 7
VEGA Deluxe ..... 199.
Vega VGA ..... 299.

INPUT DEVICES

Advanced PC Keyboards
5160 84key XT/ATswitchable ..... 59.
5161 101key XT/ATswitchable .... 79.

CH Products
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Mach II Joystick-Apple ..... 39.
Mach III Joystick-IBM ..... 49.
Mach III Joystick-Apple ..... 49.
Gamecard III ..... 39.

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KB5151 84key deluxe ..... 119.

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LIGHTGATE
Felix for PC/XT/AT ..... 159.

LOGITECH
Bus Mouse PC/XT/AT ..... 99.
Serial Mouse PC/XT/AT ..... 99.
Serial Mouse PS/2 ..... 99.

MICROSOFT
Bus Mouse w/PC Paintbrush ..... 105.
Serial Mouse w/PC Paintbrush ... 105.
Serial PS/2 w/PC Paintbrush .... 118.

MSC Technologies
PC Mouse serial PC/XT/AT ..... 98.
PS/2 Mouse serial ..... 98.
PC Mouse bus PC/XT/AT ..... 98.

SUMMAGRAPHICS
SummaSketch ..... 449.

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TEAC
55BV 360K Floppy/PC/XT/AT ..... 89.

TOSHIBA AMERICA
FDD4403 31/2" Micro 760K ..... 129.
31/2" Micro 1.44Mb w/kit ..... 139.
ND04D 360K FloppyPC/XT ..... 84.
ND04E-G 360K Floppy AT gray ... 84.
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Tri-pak 20Mb cartridge, 8" ..... 255.
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T1200F Laptop, dual floppy ..... 1395.
T3100 Laptop 286, 20Mb ..... 2995.
T3200 286 full keybd,40Mb ..... 3995.
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1200baud Pocket MODEM ..... 99.
2400baud w/software(int) ..... 149.
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Smartmodem 1200B w/sw(int) ... 299.
Smartmodem 1200 External ..... 299.
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Smartmodem 2400 External ..... 447.

MIGENT
Pocket MODEM 1200 ..... 129.

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8512 14" Color analog ..... 527.
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8514 16" Hi-res(1024x768) ..... 1395.

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Monograph sys (1024x1024) ... 1555.

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WY60 14" terminal ASCII ..... 519.

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Proprinter X24, 240cps 24pin ... 635.
Proprinter XL24, 240cps 24pin . 835.

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P565XL Color,100cpsNLQ ..... 1095.
P660 Pinwriter, 65cpsNLQ ..... 599.
LC890 Silentwriter Laser ..... 3395.

OKIDATA
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ML192+, parallel ..... 319.
ML193+, parallel ..... 469.
Laserline 6 (req.IBM int.) ..... 1399.

PANASONIC
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KX-P1091i, 192cps draft,par ... 198.
KX-P1092i, 240cps draft,132 ... 339.
KX-P1524, 24pin, 80cpsNLQ ... 595.

SEIKOSHA
SL80A1, 24pin ..... 366.
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Fuji MD2D ..... 11.
Advanced Color w/plastic box ..... 8.
5 1/4" DS/HD High Density AT1.2Mb
Maxell MD2-DD ..... 23.
Verbatim DatalifeHD ..... 23.
Fuji MD2HD ..... 22.
3 1/2" High Density Disks(1.44Mb)
Maxell ..... 49.
Verbatim Datalife ..... 49.
Fuji ..... 49.
Sony ..... 49.

PRINTER BUFFERS
Advanced 64K parallel buffer ..... 129.
Advanced 64K AB buffer ..... 169.

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- FCC Class A and B Certification
- User's Manual and "Setup" Utilities Disk
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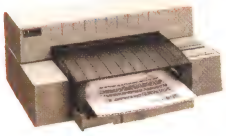

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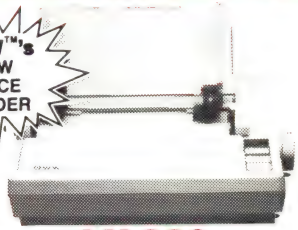

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- Front panel controls

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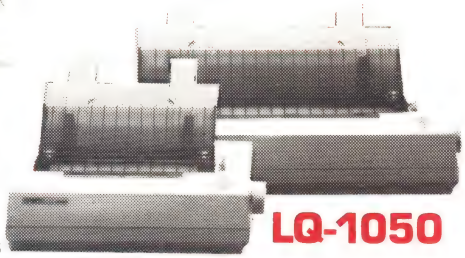
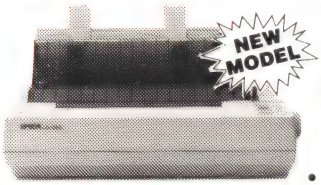


LQ-850

- 264 cps in draft mode
- 88 cps in Near Letter Quality mode
- 6K buffer
- SmartPark paper handling
- Front panel controls

LQ-1050

Options
- Tractor Feed
- Cut-sheet feeder
- 32K buffer



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- Cut-sheet feeder
- 32K buffer

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- 5 Letter quality fonts
- Front panel controls with LCD display

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- Color enhancement
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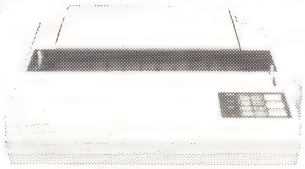
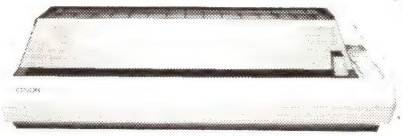


EX-800

- 300 cps (12 CPI) in draft mode
- 54 cps in Near Letter Quality
- 8K buffer
- 8 typestyles
- Front panel controls
- Push tractor feed
- Single sheet loading

Options
- Color enhancement
- 32K buffer



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- 240 cps in draft Elite mode
- 48 cps in Near Letter Quality
- 8K buffer
- 136 column
- Friction and tractor feed
- Automatic single-sheet loading
- Front panel controls
- IBM ProPrinter character set

Options
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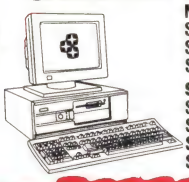

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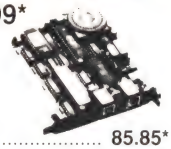

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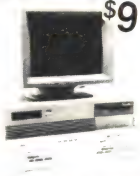

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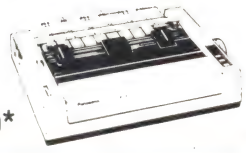

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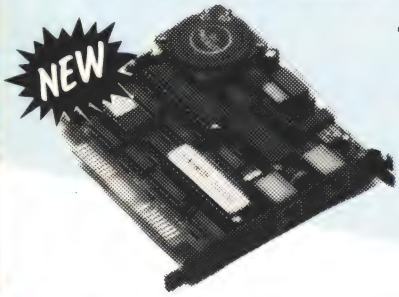

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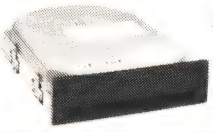

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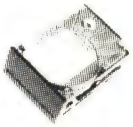

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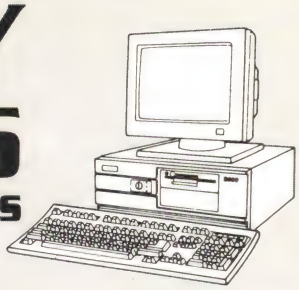

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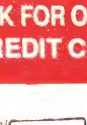
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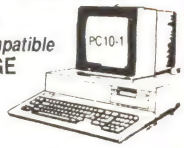
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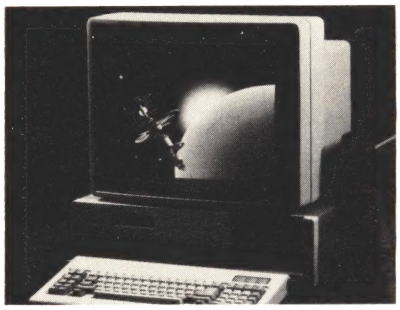

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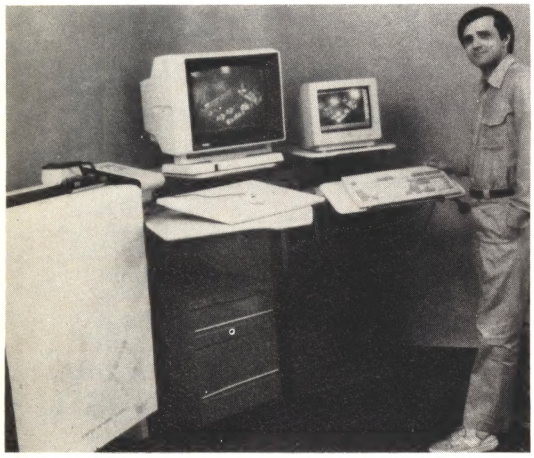

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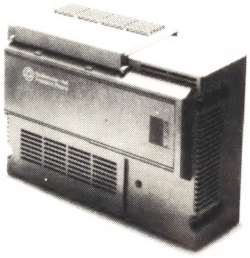

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The Not-So-Rapidly-Changing Marketplace

Dan Lavin

Many users have reached a point where they're reasonably happy with their software. Sure, there's always room for improvement. But most of us are satisfied with the kind of productivity gains we're already realizing. I'm writing this with *WordPerfect 4.2*, and I don't need high-end page-layout features to get the job done. I may never need them.

But the computer industry is marching right past people like us, constantly updating, constantly adding new features—many solely to suit the limited interests of isolated groups of multiple-unit buyers. Software is generally being weighed down by too many versions with an overabundance of features. In fact, software may become too heavy for software vendors to support in the future.

1-2-3 release 2.01, *dBASE III Plus*, DOS 3.00, and *WordPerfect 5.0* are definitive products that provide most users with all the functionality they'll ever need. Even so, the vendors of those products seem to focus on adding power-user features for maximum marketing sizzle in future releases.

How long will they be able to provide technical support for older versions? What will happen to the business customer who uses the same version for 5, 10, or 15 years?

Today's software companies are structurally unprepared for this not-so-rapidly-changing marketplace. They are creating too many new versions, and their corporate cost structures are out of line. High salaries, lavish offices, and "unique corporate cultures" simply waste needed capital.

Sure, many companies were wildly profitable during the early years of this industry. But too often, software executives credit their own genius for the success of their companies, rather than the inevitable boom of an industry in its infancy. Software is no different from any other commodity: Market forces will intervene to bring profit margins in line, just as they did for oil, steel, automobiles, telephones, and railroads.

Technical support is expensive, and much of the money being squandered today should be redirected into reserves for tomorrow's support. That's the price vendors should pay for $500 products that cost $20 to manufacture. We users are partly to blame for this situation. User-group leaders tend to egg the manufacturer on for product improvements. No one at the Lotus Week event asked when the bugs in *1-2-3* release 2.01 would be fixed, only when release 3.0 would ship. Even user-oriented magazines such as *PC World* seem more interested in news of updates than in support.

Most computer users aren't activists or power users, but we're still vitally interested in maintaining and improving our productivity. At the average small company, 20 employees sit on 10-year-old furniture. They may eventually need new computers and software, but don't expect them to buy every year or so. If a program works, it will be around as long as the furniture.

The not-so-rapidly-changing segment of the market may not be shrill or militant, but we do control our own budgets. If the current market leaders ignore us, other companies will get our business—companies with reasonable ambitions and sensible cost structures. Their products, designed for the long haul, will push current companies out of all but the high end of the market.

This process could be a long one, and it could cause major upheavals. A better route would be for today's market leaders to begin changing direction now. It took vendors four years to learn that copy protection is a bad idea. They don't have four years to resolve this issue. ●

Dan Lavin is associate director of the IBM PC Users Group of the Boston Computer Society.

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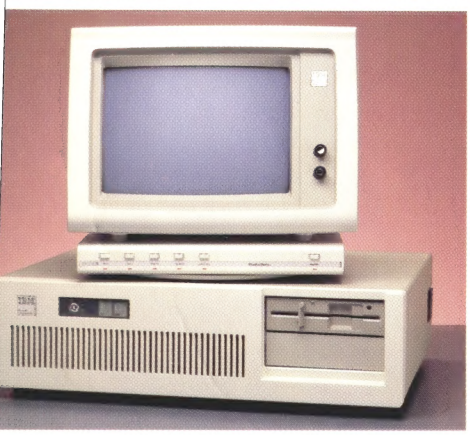

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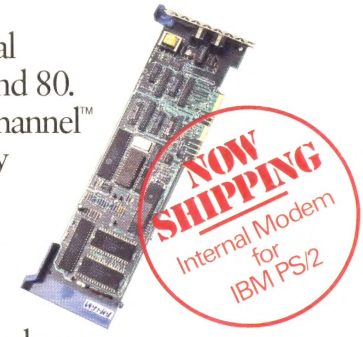

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